

GREEN SCHOOL SERIES

The Green Teacher

Ideas, Experiences and Learnings in
Educating for the Environment



CEE

Centre for Environment Education, Ahmedabad

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Centre for Environment Education (CEE) is a national institute of excellence for Environmental Education supported by the Ministry of Environment and Forests, Government of India and affiliated to the Nehru Foundation for Development. The main objective of CEE is to create environmental awareness among children, youth, decision makers and the general community. CEE develops innovative programmes and materials and field tests them for their validity and effectiveness. The aim is to provide models that could be easily replicable to suit local conditions. The views expressed in this publication are those of the authors' and not of the Centre.

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Preface

Experiencing nature and learning from it is perhaps the best way of learning about and from the environment. An outing with someone who can interpret the environment is an experience a child rarely forgets. Doing a project, creating something, taking measurements, and analyzing the findings are all techniques that make the difference between 'seeing' and 'observing' the environment.

Our school system unfortunately is too entrenched in the lecture methodology and even within that, in getting students to reproduce what is in the textbook. This is usually done without questioning and often without any relationship to observation of the real life situation. Not only are the opportunities for learning which exist in the environment not utilized, but often they are positively discouraged. For instance, a child in a school nearby, when asked by his teacher what birds eat, brought wrath upon his head by answering 'cows'. What no one stopped to ask was why the child gave this response. It was during a later conversation that it was discovered that the answer was reflective of the reality the child was seeing on his way to school. In that drought year, there were a number of dead cows on the highway en route to his school. The child used to see vultures and kites feeding on these carcasses everyday, and therefore the answer. This experience must have led, at least in the case of this child, to complete confusion, where reality was negated in favour of a textbook answer.

Introducing environment as one more subject in such a teaching environment is only paying lip service to this subject. To teach environment one has to change the very approach to teaching and learning, and not merely change content, while retaining existing teaching methodologies.

When CEE was formed in 1984 we began with a recognition of the fact that we would need to experiment with a number of different approaches to teaching and learning. We realised that any attempt at developing uniform educational programmes and materials for a country so diverse is bound to run into difficulties. While something might work in one region in one set of circumstances, it would be inapplicable in another. On the other hand, an attempt at studying, analysing and developing materials for the different situations of Indian schools would mean that the Centre would only be able to design for a few such situations. Therefore, CEE began to explore a different concept of design.

The saree is a designed piece of clothing worn all over India. Over the years, very beautiful designs, patterns and textures have been printed and woven into the Indian saree and yet, several thousand years of Indian history has not tried to stitch the saree. It is worn in many ways and fits all sizes. The final effect is the combined effort of the person who designs the cloth and the person who wears it — of the designer and the user. This is a very different concept from that of designing, say, a well stitched dress. The garment either fits or doesn't fit, and where it fits, leaves little room for the wearer to be innovative in its use.

Our educational designing has attempted to be somewhat like the saree — more a tool than a finished product, a tool that comes alive in the hands of each teacher, its application being the combined effort of the designer and the user.

The key to the whole educational system is the teacher and it is only through the initiative and innovativeness of the teacher, that change can be brought about in the classroom. We realize that this challenge deals with empowering teachers with ideas, but not prescriptions, of what to do and not to do. Teachers need to know about and be able to select from a wide variety of methodologies, the best ones suited to their own environment.

This has been the basic thinking underlying CEE's efforts in environmental education. This book represents over a decade of experience of several of my colleagues who have worked in a wide variety of projects dealing with children, both within and outside schools. The strategies and methods discussed can be used in a variety of different situations. We hope that you will find this compilation useful in the challenge of bringing our environment alive to the next generation.

Kartikeya V. Sarabhai
Director, CEE

Environmental Education: What, Why, How?

What is Environmental Education?

There are many definitions of Environmental Education (EE). For our purposes, we could understand EE in the context of the definition given below:

Environmental education is a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems and which has the knowledge, attitudes, commitments and skills to work individually and collectively towards the solution of current problems and prevention of new ones.

The first Intergovernmental Conference on Environmental Education held at Tbilisi in 1977 established the objectives of EE. These are to develop the following qualities in individuals and social groups:

- a) an awareness of the environment and its problems;
- b) basic knowledge and understanding of the environment and its inter-relationship with man;
- c) social values and attitudes which are in harmony with environmental quality;
- d) skills to solve environmental problems;
- e) ability to evaluate environmental measures and education programmes;
- f) a sense of responsibility and urgency towards the environment so as to ensure appropriate actions to solve environmental problems.

To meet these objectives, a number of guiding principles were framed for those involved in developing EE programmes and materials of various kinds. The guiding principles laid down that EE should:

- consider the environment in its totality - natural and built, technological and social (economic political, technological, cultural - historical, moral, aesthetic);
- be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages;
- be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;
- examine major environmental issues from local, national, regional and international points of view, so that students receive insights into environmental conditions in other geographical areas;
- focus on current and potential environmental situations, while taking into account the historical perspective;
- promote the value and necessity of local, national and international co-operation in the prevention and solution of environmental problems;

- explicitly consider environmental aspects in plans for development and growth;
- enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age but with special emphasis on environmental sensitivity to the learner's own community in early years;
- help learners discover the symptoms and real causes of environmental problems;
- emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;
- utilize diverse learning environments and a broad array of educational approaches to teaching/ learning about and from the environment with due stress on practical activities and first-hand experience.

The UNESCO-UNEP Congress on Environmental Education and Training (1987) summed this up to state:

"Environmental education should simultaneously attempt to create awareness, transmit information, teach knowledge, develop habits and skills, promote values, provide criteria and standards and present guidelines for problem solving and decision-making. It therefore aims at both cognitive and affective behaviour modification. The latter necessitates both classroom and field activities. This is an action-oriented, project centred and participatory process leading to self confidence, positive attitudes and personal commitment to environmental protection. Furthermore the process should be implemented through an interdisciplinary approach."

EE in India

In India, at the central level, both the Ministry of Environment and Forests and the Ministry of Human Resources Development (MHRD) have been working towards supporting EE in schools. The Ministry of Environment and Forests supports two Centres of Excellence in Environmental Education — these are Centre for Environment Education, Ahmedabad and C.P.R. Environmental Education Centre, Madras. It has also supported training of teachers in EE and school level activities under the National Environmental Awareness Campaign. The MHRD, through the National Council of Educational Research and Training (NCERT) is working towards environmentalising curricula and textbooks and in teacher training. The Environmental Orientation to School Education scheme supports initiatives by state governments and NGOs for environmentalizing school education. Some state governments have also initiated efforts within their own state.

There are several active NGOs concerned with EE at the school level, working at local, state and national levels, on a variety of initiatives including development of material, teacher training, running camps, doing school programmes, etc. Academic institutions including Teacher Training Colleges are also looking to see how they can support EE in schools. Some colleges have already introduced special papers in EE in the B.Ed. course.

Teaching and Learning About the Environment: The Role of an Environmental Educator

As teachers who are trained in the art and science of teaching, why should a teacher be specially concerned about teaching about the environment? Well, there are several reasons why the task of an environmental educator is complicated.

1. The very objectives set forth for EE — going from awareness to action—pose a challenge. While conventional classroom methods are tried and tested in achieving the objective of 'imparting information' and to some extent 'building skills', they are not always designed for, or effective in meeting the other objectives to any great extent. Which is why teachers have to explore fresh ways of teaching in order to become successful environmental educators.
2. Environment is all-encompassing, multi-disciplinary and dynamic. It has scientific, social, economic, political and technological dimensions to it. A teacher has to bring in all these aspects to capture the true spirit of environmental education.
3. EE is meaningful if it takes place in real life and is geared towards understanding and solving real-life problems. Practical activities and first hand experiences are essential for creating this understanding, but most schools are not geared towards this.

The Real Situation

Today every teacher faces a shortage of time and thus it is difficult to adopt teaching/learning methods other than the lecture and chalk and talk methods. Some of the other practical concerns that educators may face include:

- The curriculum and syllabus laid down are huge and not very flexible. They do not allow deviation in content or methodology.
- The number of students in each class is too large for any method except the lecture method to be used effectively.
- There are few resources or facilities for EE — no money for taking children to a nature camp; no laboratories where they can do experiments, etc.
- No access to reading and other materials by which the teacher can keep pace with the demands of a dynamic professional area like EE.
- Limited access to teaching aids like films, posters, charts etc. which can help the teacher teach about the environment, especially the local environment.
- Lack of conviction of some school managements about the need to take a non-traditional approach to the teaching of environment.
- Parents who see this as a diversion from serious studies and as an activity that takes up the time of their children, without bringing any concrete returns in the form of marks.
- Work overload on teachers who take up this responsibility and find they have to take on a number of extra tasks in addition to the full quota of their routine work.

The Challenge

All these and more problems face the school and teacher who take up the challenge of becoming an environmental educator. But realising the need for EE, thousands of schools and teachers all over the country are taking up this challenge. Government and NGOs are supporting them in these efforts.

Experiences from all over the country show that no matter what the situation, the teaching-learning experience can be enhanced by bringing in some innovations; and that any approach that encourages curiosity and self-learning, and fosters awareness could lead to informed concern that could be expressed in terms of positive action.

The book discusses certain innovative experiences in EE, undertaken mainly within the school system. It also suggests ideas and approaches of how EE can be brought into classroom teaching and regular school activities.

We hope this book will help all educators who have taken up the challenge of EE and inspire them to develop more ideas and take on more experiments in this area.

Photo: Sunil Jacob



"There is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society beginning with the child. Environmental consciousness should inform teaching in schools and colleges. This aspect will be integrated in the entire educational process." New Education Policy, 1986.

ENRICHING THE CLASSROOM EXPERIENCE



The school is the institutional framework within which continuous interaction takes place between teachers, students and the curriculum. For meaningful learning to take place within this framework, the interaction has to be optimized.

The curriculum provides the framework of what should be taught. However the methodology or skills for the effective use of the prescribed instructional materials is often not available to teachers.

This is especially true in the case of teaching and learning about the environment. It becomes critical if we accept that EE is not a separate subject to be imposed on already overburdened teachers and students. And that EE should not form a separate part of the curriculum but should be integrated or 'infused' with all other subjects - from science and social studies to language, math and arts and crafts.

In such an infusion approach, environmental dimensions are integrated into the existing curricular system with minimal demands. Such an infusion requires not so much new content to be introduced into the teaching of a subject, but rather, that a holistic perspective be given to what is being taught, and that it is taught so as to lead ultimately to action to improve the environment. It also assumes that teachers of all disciplines get involved in the process.

A variety of teaching methodologies may need to be used for effectively bringing in this environmental dimension. These should be such as to awaken interest, arouse curiosity, provide information and enable systematic processing of the information, help formulate codes of ethics and behaviour, and ultimately lead to positive action to improve the environment.

The teacher faces a continual challenge in using his/her imagination and innovativeness to choose from among the many activities and approaches that can engage students. Whatever the choices, they must be such as to lead to the generation of 4 Cs — curiosity, creativity, competence and compassion. Whatever the subject, the attempt must be to encourage active learning and direct participation in the experience, within a classroom/school situation, within the curricular constraints.

This section discusses how active approaches can be brought into the teaching of existing curricula, how even subjects which are not traditionally thought to be 'environmental' can be given an environmental perspective; and how environmental education centres can be built up in schools.



Greening Language

Meena Raghunathan and Mamata Pandya

The language teacher can play a key role in sensitizing and informing students about the environment, in helping them analyze issues and communicating them, while at the same time building language skills and encouraging creativity. A variety of activities could be taken up in the language class towards this. Some examples are given here.

Poetry Writing

Children from 8-14 years usually like to write poetry and often experiment with this form. Through encouraging them to write about the environment, teachers could give these efforts a focus. Here are a few preliminary exercises which could help to get the ball rolling. These exercises help in getting children to want to write poems by making it an achievable task, and by encouraging them to observe, think, imagine and articulate.

Cinquain is the French word for a poem of five lines in which the first line has one word (a noun), line two has two words (adjectives), line three has three words (verbs), and line four has four words. The fifth line is just one word — like the first (a synonym).

Haiku is three-line Japanese poetry dedicated to nature. These are usually poems which are composed as responses to, or impressions of, the world around us. Very few words are used, but in such a manner that reading them evokes an instant verbal picture.

The rules are simple: There are three lines in every poem. There are five syllables in the first line, seven in the second, and five in the third line. The lines do not have to rhyme.

Seasons form an important theme of Haiku. And also minute observations of small elements

To write a Cinquain, just guide the students through these steps and see what emerges.

Ask each student to think of any object in nature that he/she especially likes or relates to, e.g. flowers, rain, butterflies, clouds... Ask them to close their eyes for a few seconds to picture their chosen object. This could be even more effective if done at a place where students can actually see, hear and experience the natural surroundings.

- Now ask each one to begin by writing the name of the object they have chosen. This should be a single word, and a noun. For example: *Butterfly*.
- In the next line, they must write two words describing the qualities of the chosen object. These should be adjectives, e.g. *Delicate, graceful*.
- In the third line let them write three words of action

describing something that the object does. These will be verbs. e.g. *Flutters, finds, sips*.

- The fourth line must have four words describing how the child feels about the chosen object. (You can drop the rigid grammar and mix nouns, verbs, adjectives!), e.g. *Seems weak but isn't*.
- In the fifth and last line write one word that conveys the sense of the first word. (Back to grammar—this could be a synonym), e.g. *Beauty*.

Let each child read his/her lines as they would read a poem. Encourage them to follow the same rules to create cinquains on other aspects of the environment.

*Butterfly
Delicate, graceful
Flutters, finds, sips
Seems weak but isn't
Beauty*



in nature — a blade of grass, a dewdrop on a flower petal, the flight of a dragonfly. The images attempt to emphasize a strong consciousness of the close interrelatedness of all things, living and non-living, that make up the universe. Here is an example of the kind of pictures a few words have the power to evoke.

*The river leaping
Rocks angrily, roars away...
As the mountain smiles.*



Poetry Reading

Much of the beautiful poetry, folk songs, etc., in any language are related to nature. Not only can a language teacher choose such poems for teaching in the class, but can also use the poetry teaching exercise to bring in current environmental issues and concerns. For example while teaching the verse 'Tyger, Tyger burning bright', the teacher can not only highlight the awe and majesty of the tiger, but can also discuss the current situation of the tiger in India, the declining numbers of tigers, causes for their disappearance, and efforts being made to save them.

Stories and Essays

The usual creative writing exercises which are assigned to students can be given an environmental orientation. Children could be asked to write stories and essays on environmental themes and issues. Properly phrased open-ended topics can encourage children to think, analyse, research and write.

It would also be good to tie-up such writing exercises with an event. Such an activity can help the children crystallize their thoughts about the event. For example, when a class visits a zoo, an essay on something like: 'Thoughts of a Caged Lion' or 'Zoo: Haven or Torture Chamber?' can be given as a topic.

Debates and discussions organized in the language class can play the same role, and additionally give children the confidence to speak and express a point of view.

Plays and Skits

The language teacher can also encourage the students to write scripts for plays, skits, or TV spots. Dramatization of stories with environmental themes or real-life environment related conflicts or situations can be taken up. For instance, if the children know the story of Chipko, they may dramatize it. The students could take the teacher's help, finalize the script and put up the drama on any appropriate occasion. Or they could use a ready script and dramatize it. An example of such a script which gives ample scope for improvisation on the part of the students is given on page 30.

Posters and Slogans

Students can be asked to write copy for posters, coin slogans for use in rallies etc. In each of these exercises, it would be useful to analyse what makes for effective communication in the identified medium e.g. slogans should be short and rhyming.

Interviews and Surveys

Important, if undervalued, language skills could be taught by getting students to conduct interviews and surveys. In this, they will learn to ask properly worded questions and listen, interpret, and understand what people are saying. These interviews should be done in 'real life' and may be done by individual students or in groups. The information gathered could also be used for some other project that the students are involved in. Interviews could also be included in a school magazine, or given to a local paper to carry.

Some interviews they could do: Interview the Municipal Commissioner on why there is garbage all over. Talk to the Zoo Director about his job. Talk to residents in an area as to how they can contribute to a better local

environment. Talk to senior students in the school as to why they do not use public transport to come to school. Talk to people to find out their views on a controversial environmental issue that touches their lives.

Some surveys they could conduct: Survey of water resources and water availability in a community; garbage generation and disposal habits in a residential locality; survey of environmental health hazards in an area, etc.

Newspapers for the Environment

The language teacher could also bring home to students the importance of media in creating environmental awareness. Apart from following environment-related news as reported in the media, they could be encouraged to write on these issues. The different types of pieces in a newspaper/magazine could be analyzed and they may choose to write any one: e.g. a descriptive feature on an animal or tree; a report on an environment-related event or happening; an interview with an environmental personality; an analytical article on some issues, or reports on the findings of a survey. They would need to be guided to do their research thoroughly in order to write a proper piece. These pieces could be sent to the local newspaper, especially the special children's pages, the school magazine, or other children's magazine.



Make more friends this way, and build up an autograph collection. You will realise that no two trees are identical. Each has its own form, pattern and personality.

Fun with fingerprints:
Make impressive impressions with just a

stamp pad, your fingertip and lots of imagination.

Press your thumb or finger over the stamp pad. Now make a print by firmly pressing the thumb or finger on a sheet of paper. Use single prints or group several prints together. Use different fingers too for

Some Water Verses

The leaky tap drips day and night
Just fix it right or shut it tight
It seems the earth with water abounds
But think-it's every drop that really counts.

The tap is on, you brush your teeth
The water flows, you soap your feet
Just think of all the water lost
To close the tap, what does it cost?

The water bottle you take to school
The water in it is nice and cool
You drink a bit, the rest you throw
The water could help a plant to grow.

A related activity would be encouraging children in the language class to write letters to the editor on environmental issues they feel strongly about, their reactions to reports in the newspaper etc. These could be sent to local newspapers to be considered for publication.

Advertising Appeal

Given the impact of advertisements on the minds of children, this would be a medium which would interest them. Children, depending on their age, could enjoy designing a hoarding, developing a spot, or writing copy for ads or jingles with environmental messages.

Such an exercise could lead them to analyse and discuss the ways in which products are sold to us, what images are used, what feelings are evoked, etc. This could lead towards a discussion of the ethics of advertising, the role of social advertising, the reality of an increasingly consumption-oriented society, and its impacts on the environment, etc.

The themes given to them could be selling an environmental product or environmental value. e.g. the benefits of a forest, or environmental ethics e.g. rights of animals etc.

Newswatch

Meena Raghunathan



Textbooks are important in order to clarify environmental concepts and teach students the science underlying environmental phenomena and issues. But there is another easily available resource — newspapers. Newspapers have the advantage of being readily and inexpensively available. Newspapers as a resource are also adaptable in that they can be used at different levels and related to different subject areas.

Newspapers are current, they deal with real-life issues. They help bridge the gap between the classroom and the real world outside.

They can be a rich resource for bringing home to students how environmental issues and problems touch our lives; to illustrate that these issues are not unidimensional, but have scientific, economic, social and political angles; that they are dynamic; that often there are many sides to a controversy, and there is validity in the various points of view. Here are some ways in which newspapers can be used to bring current environmental issues into the classroom.

Bulletin Board

A special bulletin board can be set aside in the school or class for environment-related affairs. A small group can be made responsible for each week's display. The students will need to follow the daily newspapers to clip out environment-related news and display this attractively, so that the whole school/class is attracted to come and read it.

Scrap Books

Individual students or small groups may also maintain environmental scrap books throughout the year. They can refer to a variety of newspapers and magazines and clip out information. They could classify the different

clippings chronologically or topically, and paste the items in different sections of the book. The scrap book can include photographs, captions, illustrations etc. from magazines and newspapers, and also those added by students themselves.

News Reading

Once a week, some time may be set aside in the school assembly for an Environmental News Broadcast. The information for this may be gathered from newspapers, radio, TV, etc. and presented by one student to the entire school.

Analyzing Press Coverage

Older students could take up certain projects such as comparing the reporting of the same environmental issue in different newspapers, e.g. in different national dailies; different local dailies; English and other language dailies; etc. Some factors that they could consider in this exercise are (1) space allotted to the issue (2) where in the newspaper that issue is reported (i.e. which page) (3) which of the reports are giving various points of view (4) which newspaper seems to be supporting which point of view.

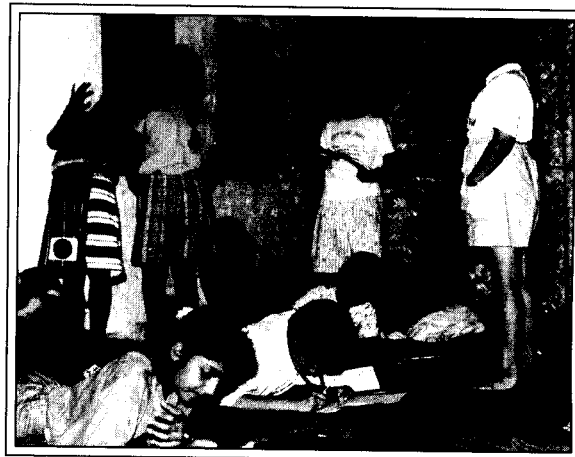


Photo courtesy: Nature Trails

Radio and TV

With regard to radio and TV also, students can take up similar exercises. They could also write reviews of environment-related programmes that they see or hear.

Taking it Further

Such exercises will have the additional advantage that children will form the habit of reading the newspaper, and of taking an

interest in programmes they may otherwise not pay attention to.

All these exercises will help make students aware of current environmental issues. On this basis, various other activities could be built: e.g. debates or panel discussions may be organized on a 'hot' issue; students could be asked to research and prepare their own analysis of some issue; experts may be called in to speak to the class on any issue which specially interests them.

Some Environment-related Magazines/Newsletters

GREEN FILE: Monthly compilation of environmental newsclippings on India and South Asia with index, key words and summary.

Language: English; Annual Subscription: Rs. 550 for schools & individuals

Address: Centre for Science and Environment 41, Tughlakabad Institutional Area, New Delhi - 110 062

DOWN TO EARTH: A science and environment fortnightly of the Society for Environmental Communications. Carries news, reviews, interviews, special reports on science and environment.

Language: English; Annual Subscription: Rs. 264

Address: Society for Environmental Communications, 41, Tughlakabad Institutional Area
New Delhi - 110 062

WWF - INDIA QUARTERLY: A newsletter of the World Wide Fund for Nature, India. Carries news and issues on wildlife and nature.

Language: English; Annual Subscription: Rs. 100

Address: Network Development, WWF - India, Post Box 3058, New Delhi 110 003

HORNBILL: A quarterly magazine for children that carries conservation notes, news and comments.

Language: English; Annual Subscription & Membership fee: Rs. 1000 for institutions, Rs. 75 for students

Address: Bombay Natural History Society, Hornbill House, Dr. Salim Ali Chowk, Shaheed Bhagat Singh Road, Bombay - 400 023

SANCTUARY ASIA AND SANCTUARY CUB: Ecology and wildlife bimonthly magazines with articles and cover stories on environment and related issues. Cub is for children.

Language: English; Annual Subscription: Rs. 98 for Asia, Rs. 46 for Cub

Address: 602, Maker Chamber V, Nariman Point, Bombay 400 021

CEE-NFS: A monthly News and Feature Service from the Centre for Environment Education. Carries features on different aspects of nature, articles on environmental issues, interesting news, interviews, etc.

Language: English, Hindi, Kannada; Annual Subscription: Rs. 300 for institutions

Rs. 150 for voluntary organisations/individuals

Address: Centre for Environment Education, Thaltej Tekra, Ahmedabad - 380 054

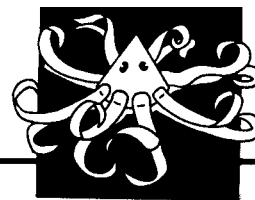
NEWS EE: A bimonthly newsletter for environmental educators, Government agencies, NGOs, educational institutions etc. Carries information about events, projects, experiments, innovations and developments in the field of environment and environmental education.

Language: English; Annual Subscription: Rs. 50

Address: Environmental Education Bank (EE Bank), Centre for Environment Education,
Thaltej Tekra Ahmedabad - 380 054

Creative Handiwork

Meena Raghunathan



A variety of arts and crafts can be used to create awareness about the environment among children, while at the same time developing skills. Children of different ages enjoy group undertakings of creative activities. Some points need to be kept in mind when planning arts and craft activities so that the objective of creating environmental awareness may be achieved. Experiences can be further enriched if the crafts teacher could plan activities in discussion with the environment studies or science teachers, so that there is a good link between the topics being taught to a particular class and the craft activities undertaken by them.

The Educational Experience

The point of crafts for EE is not just to make something. This is a valid objective for a craft class, but if the same exercise is to become an EE effort, there has to be some concept, attitude or skill related to the environment that is being built through the activity. For example, while teaching children how to make a butterfly from chart paper, the following concepts can be discussed:

- What group of fauna does a butterfly belong to? (Insects)
- What are the physical characteristics of insects? (6 legs, 3-segmented bodies—this can be stressed when the children prepare and paste the legs).
- What are the noticeable features of butterflies? (they usually fold their wings; they have antenna—these points can be stressed when their body parts are being made).
- The variety of sizes and shapes of butterflies (may be discussed while cutting out the wings and body).

- The variety of colours in butterflies and the purpose of colouration (could be discussed while colouring or painting the wings).

Similarly, while making an earthworm from chart paper or clay, the body structure of the earthworm and the important role of earthworms in keeping soil fertile could be discussed. Children could understand why earthworms are called farmer's friend.

Or, while doing 'Best from Waste' activities, e.g. making a Bottle Bird from an old medicine bottle, or a toothbrush hedgehog, the following concepts could be discussed:

- What is waste? (that which we no longer have use for)
- What types of waste do we generate at home? (can be broadly classified as biodegradable and non-biodegradable).
- What happens to the waste we throw away? (Ragpickers retrieve what they can get a value for; municipal corporations dispose off large parts, usually through landfilling. But since the amount of waste we are generating is increasing, systems are

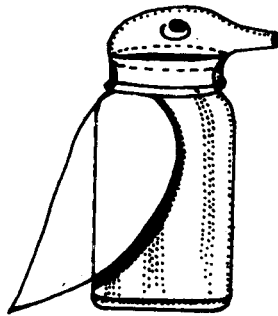


Photo: Sumil Jacob

Bottle Bird

You will need:

- Small glass bottle with nozzle (an old eye/ear drops bottle).
- Some coloured paper, scissors, gum.
- Turn the plastic lid with nozzle into the head and beak of a bird by sticking on two eyes made of paper or tiny beads. Wrap coloured paper, cotton cloth, and wool on the bottle, to make the bird's body. Make and stick wings of another colour. The bottle bird is ready to fly!



not able to cope and we find garbage on the roads and streets.)

- What can we do about this (Reduce, Reuse and Re-cycle)

Involving All Children

While most children like such activities, some may not, and yet others may not be specially talented in this direction. It is important to recognize these differences and allow children some element of choice in doing these activities. One way would be to get children to work in small groups as it could facilitate the sharing of different skills among children and no child feels left out. It will help in team building and generate lively discussion and interaction.

The Process

Since the purpose of the exercise is to internalize certain concepts through doing a craft activity, the teacher should stress the concepts, rather than the actual product.

Children's creative talent and interpretation of

the environment also need to be encouraged as far as possible. While one is trying to teach insect physiology and characteristics while making a butterfly, if a child is keen to colour it in impossible gold and silver hues, she/he could be allowed to, while gently pointing out that one is unlikely to see such a butterfly in real life.

Drawing and Painting

Themes given to children for drawing and painting tend to be limited to depicting festivals, landscapes, still life etc. These too could be made more "environmental". That is to say, real-life situations, often those that children encounter, could be set as themes for representation. A discussion prior to starting the art work should stress that children's work should be based on what they really see around them: A scene from a large city could depict traffic congestion, pollution, garbage, buildings etc. A typical "village" scene could include bare hills, dry rivers and ponds, and sparse vegetation.

Children could also depict scenes such as 'What I see from my house window', or 'On my way to school'. They could be asked to project into the future, to depict an imaginary scenario where all vegetation has been replaced by concrete jungles, or how a city would look when hit by an epidemic, intense pollution, or nuclear war. They could also be asked to depict what they imagine as an ideal future scenario with respect to a home, a city, a rural area or a wilderness site.

Another activity that could be undertaken is preparing posters and panels to make up a single theme exhibition such as, My City, Water is Precious — Conserve it, Garbage — Problems and Solutions. Posters could also be made for a school campaign on a variety of themes: Save Water/Electricity, Keep Our School Clean, etc. Models on these themes could also contribute to enriching the exhibition.

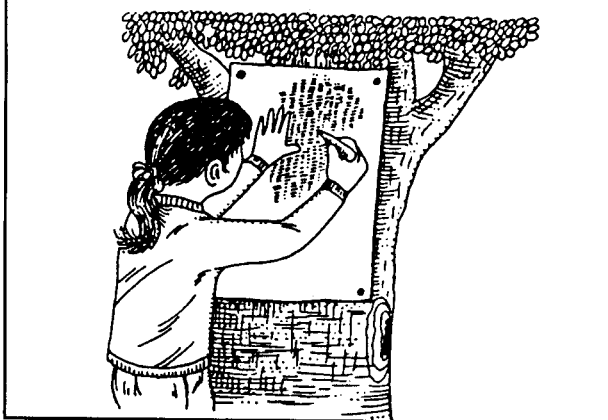
These could include facts and figures which students could collect with guidance from other subject teachers also.

Experiments with using natural dyes and colours made from different kinds of vegetation etc. would also constitute an exciting learning experience. These could be used to make greeting cards, bookmarks etc.

Stones collected by children can be painted to resemble insects and other creatures, and used as paper weights.

Tree autographs are a great way to get younger children to learn more about trees through art.

To take the tree's autograph, hold a blank sheet of paper steadily against the bark. Rub a crayon over the sheet to get the impression of the bark. The ridges will be coloured, while the cracks in the bark will remain blank. If possible, match the colour of the bark with the crayons you use, or describe the colour alongside the autograph. Try this with different kinds of trees and compare. Take impressions of the different barks on paper. These are the trees' autographs.



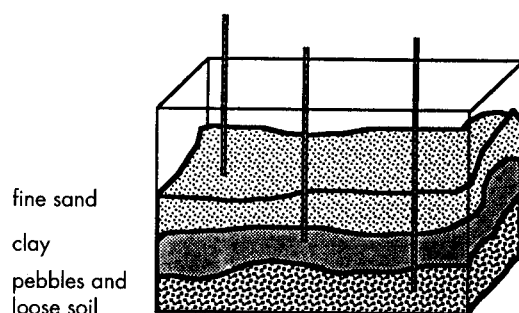
Making Models

Older children (Std 8 or so) may not like to do 'craft' activities, though they may still enjoy working with their hands and making things. Involving these children in making models, and preparing for an exhibition etc. would generate hands-on experience as well as participation. A

variety of skills and concepts can be learnt through making matchbox models, say of the school/village neighbourhood or/town. They could also make models that demonstrate how certain principles work.

Aquifers and Wells

This model helps to demonstrate the process of recharging of wells by groundwater. Take an empty aquarium container. Line the bottom of the container with a 5 cm layer of pebbles, stones and loose soil. Mark the top portion with



a few drinking straws of one colour and insert them into this layer.

Over this layer, let the students form a 5 cm layer of dry and loose clayey soil. A few straws marked with another colour should be inserted into the layer of clayey soil. The topmost layer is to be a 5 cm layer of fine sand. Some more straws marked with a different colour should be put into the sandy layer (see figure).

Tell the students that the straws represent wells. Let the students pour water gently, a little at a time, along the walls of the aquarium, without disturbing the soil layers. Let them continue, until the water has percolated through to the bottom layer. Let the students find out which of the straws get water first and which last. One way to do this is to put a thin dry stick in each straw and measure the wet part. How does the water that reaches the stones and pebble layer appear?

Photo: Sunil Jacob



Sharing the Experience

Children like to show what they create to others. It might be therefore interesting to put up a display of environmental arts and crafts

created by students for the rest of the school, parents, etc. In addition to displaying the products, the children should also explain what they have learnt while doing the activity both in terms of the skill - "how to make", and the content "more about their project". For example, if they have made things out of "waste" material they could discuss types of waste and recycling/reuse of waste. If they have made animal/bird models, they could talk about that animal e.g. snake, earthworm and its role in the environment. If they have made cards with leaf imprints, or used natural dyes they can explain the process to others. In case of models they can demonstrate how they work and what they depict.

Undertaken in this spirit, an arts and craft class can become a gateway to exploring the environment.

Photo courtesy: CEE-South



Show and Tell

Mamata Pandya



Textbooks are full of concepts, many related to fundamental principles of the environment. These are presented in a textual format, supplemented at best by an illustration, a graph, or a photograph. Children learn these by reading and repeating, as they do everything else in their books. Rarely is there an opportunity to 'experience' these concepts by doing. As a result children may not fully understand the principles, nor are they able to make the linkages between what they read in their books and how this relates to their own life.

How does one take the step from passive to active learning? Sometimes it takes just a small demonstration or experiment to transform an isolated, abstract textbook fact into a tangible real-life subject.

Making Numbers Count

Take one of the most common topics that is taught from the primary classes upwards — the distribution of water on earth.

Traditionally this is presented as percentages hidden in the text, numbers in a table, a pie chart or bar graph.

Distribution of water on earth in %

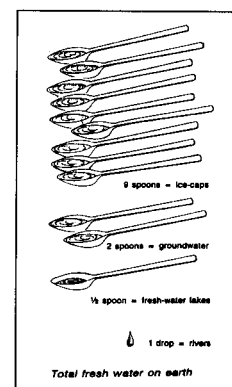
Oceans	97.2
Ice-caps	02.0
Groundwater	00.62
Fresh water lakes	00.009
Inland seas and salt lakes	00.008
Atmosphere	00.001
Rivers	00.0001
Total	99.8381

But what do these numbers really convey? How can we transform these into something that will make a child exclaim in astonishment? Here is one way of doing this.

A drop of water

Divide the class into small groups. Ask each group to measure 2200 ml of water into a container. If a measuring cylinder is not available an empty soft drink bottle of 300 ml capacity may be used. Tell them to assume that 2200 ml represents the total water available on earth.

Ask them to take a teaspoon and measure out 12 spoonful of water into a small transparent container. Tell them that this is the total amount of fresh water on the earth, including the water found in lakes, rivers, ice-caps, and as groundwater. The water that remains in the large container represents



salty water found in oceans and seas. From the container with 12 spoonful of water, let the students measure out two spoonful into a dish and remove into it half-a-spoon of water from the container which now has 10 spoonful of water. This represents the water found on the surface of the earth in freshwater lakes. From the remaining water in the smaller container, let the students remove one drop using an ink-dropper. This drop represents the amount of water found in rivers. The smaller container will now have about nine spoonful of water left in it. Tell them that this represents the amount stored in ice-caps.

Ask the students to compare the quantities of water in the various containers.

You could extend the discussion to include related topics. For example, ask the students how the fresh water stored as ice becomes available to us. Ask how people use sea water and whether it can be converted to fresh water for our use.

Continuing with the theme of water, here is an equally simple but effective demonstration of how much water can be saved simply by repairing a dripping tap. This can help to reinforce the importance of preventing water wastage.

Every drop counts

Gather the students around a water tap. Place a bucket under the tap and adjust the tap so that the water drips drop by drop.

Let one student take charge of the stopwatch or minute glass and be the time keeper. Ask another student to hold a measuring cylinder under the dripping tap. As soon as the time keeper gives a signal at the end of one minute the cylinder should be removed from under the tap. The water collected in the cylinder should be measured. Based on the amount of water collected in one minute, ask the students to

calculate the amount of water that would be wasted in one hour or in a day from the dripping tap.

You could lead a discussion on the most common causes of water wastage in our homes, schools, offices, etc. and on methods of preventing water wastage.

The classroom discussion could be carried on by giving students observation and survey assignments to be done at home. For example information could be collected on how much water is used everyday for brushing, bathing, cleaning, washing clothes, etc. This could be compared to the amount of water wasted from a dripping tap in a day.

Two simple examples of how numbers become real, rather than just figures on a page.

Invisible to Visible

An equally abstract concept is that with every energy transfer, some loss occurs. Here is a game that demonstrates this.

Energy relay

The students should be divided into two groups with equal numbers in each group. Each group should form a row, standing one behind the other. The rows should be parallel to each other. Each student should stand two paces away from the next student. Give a cup full of water and a teaspoon to the first student in each row and a similar empty cup to the last student in each row. All the other students should be given a spoon each. The first student with her cup of water stands facing her row. The



Photo: Mahendra Khadas

second student moves to the cup bearer who takes a teaspoonful of water and transfers it to the spoon of the second student.

The second student then takes the spoonful of water and transfers the water to the spoon of the third student. Then the second student goes back to the first student for another spoon of water. In the meanwhile, the third student carries the teaspoonful of water to the fourth student and transfers it to his spoon. The fourth student takes it in his spoon and transfers it into the spoon of the fifth student and so on, till the water reaches the last student. The last student receives the water in his empty cup.

When the leader's cup is empty, let the students see how much water there is in the tail-ender's cup.

You could generate a discussion on what happens to the missing spoons of water. Tell the students that each spoonful of water represents a quantity of energy and that loss of energy takes place at every transfer.

The students can play the game again, taking care to minimize the water (energy) loss in transfer.

Simulating Real Life

Soil conservation is another recurring theme at all levels of school education. The role of vegetative cover in conserving soil by preventing erosion is usually learnt in a parrot-like fashion.

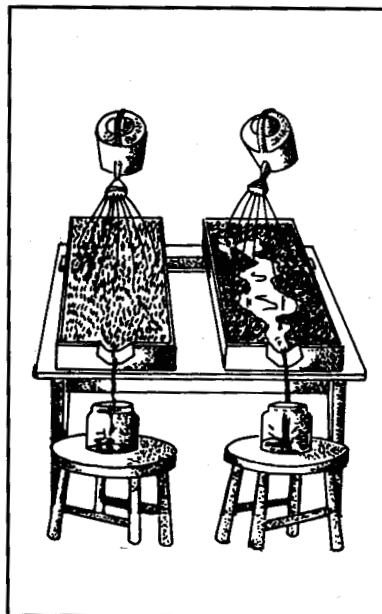
An effective way to demonstrate what erosion really means would be to take students out to sites where bare land shows the ravages of wind and water erosion. In case such a field visit is not possible, here is a classroom activity which can help explain the idea.

Protective cover

Let the students take two cardboard or wooden boxes or trays approximately 90 cm x 50 cm x

15 cm. Line them with a plastic sheet to make them leak proof. These sheets can be made by cutting open old plastic bags and fusing the edges together with the help of a candle. At one end of each box cut a 'V' notch 10 cm deep and fit it with a tin spout to draw the run-off water into a glass jar (as shown in the illustration).

Fill each box with 3 - 4 cm layer of brick pieces and pebbles, followed by 3 - 4 cm layer of ordinary soil, followed by 3 - 4 cm layer of manured soil. Sow mustard seeds or any other quick growing plant seeds in one box. Leave the other box bare. Sprinkle water on Box 1 regularly till the plants are 8 - 10 cm high.



Now set the boxes on a table so that the spouts extend over the edge. Place a brick or a stick under the other end to give them slope. Place empty glass jars on stools beneath the spouts (as shown in the illustration).

Now let the students gently pour equal amounts of water over the two boxes. Let them check the rate of flow and collect the water that flows out from the two boxes in the glass jars. Let them note the difference in the quantity and quality of water collected in the two jars.

The demonstration can be followed up with a discussion on points such as: Why is the amount of water that flows out from the vegetated box less than that from the bare box? In which jar is the water more muddy?

How do plants help to conserve water? Why is it necessary to cover and protect the soil by natural means?

These are a few examples of using demonstrations to help concretize abstract concepts. Textbook lessons supplemented and complemented by such exercises, can help students to comprehend the written word more easily. These are also more likely to leave a longer lasting impression as compared to something read from a textbook.

Strengths of "Show and Tell"

The strengths of this approach are that it is not

difficult to device experiments and demonstrations, that can generally be fitted within the time allocated to teach a particular topic. In some cases, student participation can become part of preparing the models for the purpose.

Demonstrations help in building an understanding of place, time, change and relationships using actual phenomena. They also help develop students' skill of observation, recording, measurement, estimation, and calculation. The demonstration can become a good take-off point to generate a wider discussion on the theme, and there are better chances of a more active student involvement in the same, as students have been active

observers of, or even participants in, the demonstration. And every teacher and educator can device his or her own simple demonstrations and experiments.

Students can be encouraged to share the experience and the learnings with other classes also. This approach can effectively use relevant first-hand resources and real life experiences as a basis for learning.

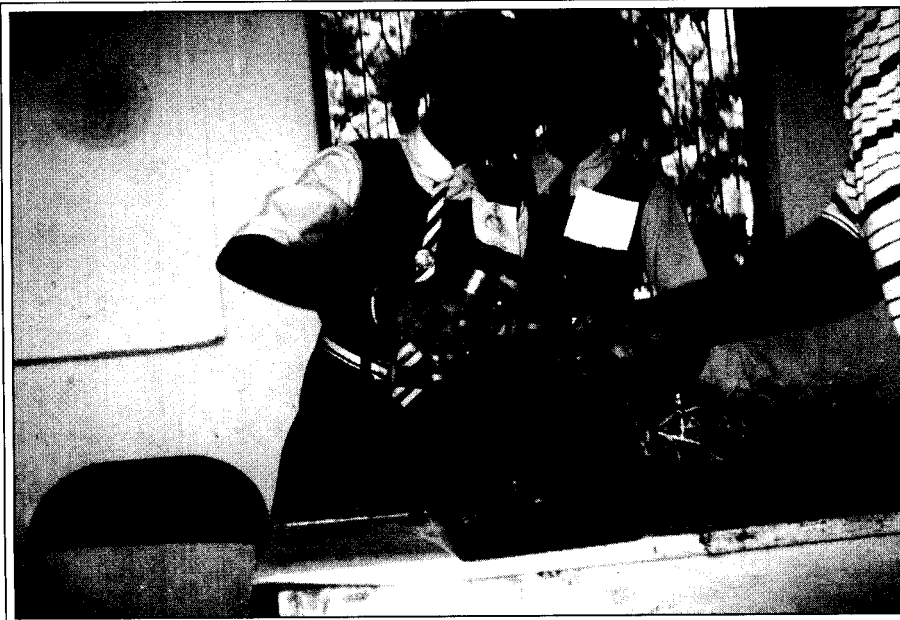


Photo courtesy: CEE South

Fun and Games

Rahul Barkataky

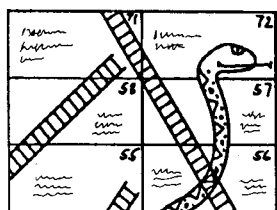


The New Webster's Dictionary of the English Language defines games as a "diversion in the form of chance, endurance, or a combination of these, pursued according to certain rules". Nearly all our existing games are modified forms of games of great antiquity.

Trends in recent years have highlighted the need for teaching methods other than the traditional "chalk and talk". There is an acknowledged need for students to know about their environment and develop practical skills which will be useful to them in their later lives. The use of games in this context is not new. Even Plato advocated the use of play in teaching and learning.

An educational game is an activity in which players use data and/or skills, usually in a competitive situation. It is useful for presenting repetitive learning in novel ways. Those who work with children will understand the need for self-expression and hands-on activity, as opposed to direct verbal teaching-learning process. It is felt that activity oriented sessions bring about greater participation and creativity not only among children, but adults too.

Although in EE games the situation in which the information and skills are used may not accurately reflect some aspect(s) of reality, yet they provide an innovative, educative, entertaining and participatory approach in making children sensitive about the environment, and ultimately encouraging them to take action. Games can help in creating awareness, knowledge, values and skills.



Types of Games

Games in EE, like general games, can be broadly divided into outdoor and indoor activities. An outdoor game provides a favourable learning situation in which one can learn about the environment and the complexities involved in it.

There can be several types of educational games. Some types are described below.

Race Games: In race games, players compete to complete a circuit on a track on the game board e.g. ludo. Moves are governed by the random numbers cast up by dice. These are primarily games of chance. Some examples of EE race games include Water Conservation game or a Snake and Ladder game modified to give environmental messages.



Photo: Sunil Jacob

Strategy Games: The ideal strategy game eliminates the element of chance. Success depends strictly on the playing skills of the competitors, e.g. chess. Example of an EE strategy game is 'Prey-Predator' (see page 23).

Games of Manual Skill: These involve manual dexterity and good hand-eye coordination. e.g. Carrom, Billiards, Darts. An example of an EE manual skill game is 'Segregate your Garbage' (see page 22).

Mathematical Games: They can be divided again into two types:

- i. games that explicitly require mathematical reasoning in their play, and
- ii. games to which some mathematical theory can be applied although it is not necessary for playing the game. An example of an EE game that can be mathematically analyzed is 'Oh Deer !' (see page 24).

Word Games: These involve manipulation of the basic units of language for amusement and entertainment. They challenge the imagination and can increase a player's general knowledge and vocabulary. There are two basic types of word games. One type consists of words of similar meanings and sounds, and substitution of letters. The other type usually involves guessing and listing objects and words as in "Who Am I?" (see page 25).

Some other types of games could also be adapted to teach environmental concepts.

Solitaire Games: These games are evolved from strategy games and are essentially puzzles for a single player. They generally use a board on which pieces are laid out in a starting position. To start play, a piece is jumped over an adjacent piece to the empty center space and the stationary piece removed from the board. Each jump constitutes a move and the player competes with himself/herself by trying to make the fewest possible jumps. Play ends when the board is cleared of all but the winning piece.

Tile Games: Involve both strategic play and chance. The factor of chance occurs in the mixing of the tiles, a procedure similar to the shuffling of a deck of cards. Most games

require that the tiles be laid out in a particular pattern with the tile sections matching identical picture/word combinations on other tiles.

Advantages of Games for EE

1. High level of motivation and fun can be engendered in participants
2. A high degree of retention of what has been learnt, due to the dynamic nature of the activity and also because of the discussions which may continue for days or even weeks afterwards.
3. Feedback of the effects of decisions and actions is usually clear, which produces reinforcement of appropriate behaviour.
4. Games also alter the relationships between students and teacher. The teacher is seen more as a facilitator in learning than as a source of knowledge.

However this change of relationship could lead to the first disadvantage.

Disadvantages

1. Once a game has started, the direction, pace, and process are no longer in the hands of the teacher. It is the participants who by their decisions and interactions, consciously or unconsciously determine the way in which things proceed.
2. The teacher can never be sure of how comprehensively the subject of the activity will be covered, nor what other areas of concern may be recalled.
3. Games need time — time to prepare, time to run, and in particular, time to debrief and discuss.

Assessing Games

It is very important on the part of the educator conducting games to assess the educational value of particular games. The following questions should be kept in mind before carrying out these activities:

- i. Do the objectives of the activity conform to the objectives of the section of the course being studied?
- ii. Is the game appropriate for the students?
- iii. Is the game interesting?
- iv. Does the game convey the desired concepts?
- v. What is the central theme presented in the game?
- vi. What are the choices available to the participants?
- vii. What are the different moves or activities provided for the participants?
- viii. What are the rules?
- ix. How is the activity organized?
- x. What kind of discussion and debriefing is required to conclude the game?

The last question is very important in case of games in EE. The discussion and debriefing which follow becomes an occasion for exploring concepts that have become apparent during the course of the game, and is also an opportunity to draw out attitudes, experiences, and knowledge from the participants, and relate these to the theme or concept.

Guidelines for Conducting Games

1. Do not overuse games, otherwise participants may reach a point of saturation.
2. Incorporate the activity into the overall structure of a learning unit. For example if the learning unit talks about energy transfer in a food chain, "Predator-Prey" can be played.
3. The game should be adapted for the needs of a particular level of students with a particular subject/class. For example if the class is on mathematics/economics and the teacher wants to teach about the importance of resources in a system at

upper primary level, then one can play "Oh Deer!" and interpret the results through discussions and calculations.

4. While choosing or designing a game, ensure that the exercise embodies the material to be learnt, and yet can be played by those who have not yet mastered the material. It is important to ensure that students really have to use the material in order to play. For example, in "Who Am I?" the child gets to understand the basics of plant and animal classification. However it is not essential that to play this game the child needs to have prior knowledge of classification.
5. Do not emphasize winning. Encourage students to see their achievement within the context of the concept in the learning unit.
6. Encourage group student activities.
7. Ensure that students see the activity as part of an integrated unit, discuss the purpose of the activity and list learning objectives.
8. Keep all rules and directions to a minimum, especially at the start of the activity.
9. Do have a discussion after the game. The discussion should be centered around the main concepts the game tries to convey and any other variations that have been tried out.

Adaptation/Interpretation

Adapting or interpreting a game to convey certain concepts is an important activity. Adapting a game to suit a particular learning situation is a game in itself. Students could also be encouraged to create their own games.

Tips for Teachers Using Games

1. Try not to correct minor mistakes of players.
2. Avoid offering a better strategy which a player does not perceive during the game.

3. Let students elaborate or slightly alter the rules of the game.
4. Do not review in minute detail the purposes, rules and materials of the game being played.
5. Don't keep perfect order. Games should be fun and noisy!
6. Try not to restrain the moderate physical movement a game may require.
7. Avoid answering participants questions about the game with 'that's not the in the rules'. It may not be possible for the designers of a game to account for all events and questions.

Conclusion

Teachers who have not tried using games as part of their repertoire of teaching techniques will usually find that they are worth trying because of the high level of motivation and retention they produce. The techniques are not difficult but they require commitment and enthusiasm to make them work. And the experience of a game is an enjoyable one.

References

UNESCO. 1983. *Guide on Simulation and Gaming for EE*. UNESCO, Paris.

Tan, Merle C. 1990. Games and Simulations in Environmental Education, *Sourcebook in Environment Education for Secondary School Teachers*. UNESCO, Bangkok.

Monroe, Paul(ed.). 1990. *International Encyclopedia of Education*. Vol. 3(A) GAI-HUM. Cosmo Publications, New Delhi, India.

Academic American Encyclopedia. Grolier Incorporated, Connecticut, USA.

Van Ments, Marry. 1990. Simulations, Games, and Role-Play. *Handbook of Educational Ideas and Practices*. Routledge, London: 823-31.

Project WILD. 1992. *K-12 Activity Guide*. Project WILD, USA.

Centre for Environment Education (CEE). 1993. *Exploring a Tree*. CEE, Ahmedabad, India.

Segregate Your Garbage

Objectives: To enable students to:

- i. recognize the importance of segregation of garbage;
- ii. identify that solid waste can be divided into dry waste, wet waste, infectious waste and toxic waste.

Materials: Writing materials; four empty baskets/bins

Procedure:

- i. Make a list of solid waste items under the heads 'dry waste', 'wet waste', 'infectious waste' and 'toxic waste'-e.g. paper, vegetable peels, discarded bandages, medicine bottles, etc.
- ii. Write down four names from these lists on four pieces of paper. Mix them together and spread them out on a table or floor.
- iii. Label the four baskets/bins as 'Dry Waste', 'Wet Waste', 'Infectious Waste' and 'Toxic Waste' respectively. Place the bins with the labels facing the students. The baskets/bins should be kept at least one to one-and-a-half metres away from the table or where the paper pieces are.
- iv. At a clap or whistle one student has to separate the components, crumple each piece of paper into a small ball and throw it into the appropriate basket from the distance indicated above. The activity has to be completed within 2 minutes.
- v. After this, the student should explain as to why he/she threw a particular component (say banana peel) into a particular basket.
- vi. Put out four different chits having different names of different items of garbage and call another student and continue similarly.



Prey-Predator

Objectives

To enable students to:

- i. discuss predator-prey relationships;
- ii. describe the importance of adaptations in predator-prey relationships; and
- iii. recognize that limiting factors, including predator-prey relationships, affect wildlife populations.

Materials

Food tokens (could be pieces of cardboard, chalk, etc) enough for two per student; some labelling devices to mark predators; string, chalk for marking; pencil and paper to record number of captures, if desired.

Procedure

- i. Identify students as either 'prey' or 'predator' with approximately one predator per every four to six prey.
- ii. Mark the playing area in a field or open space according to the group size. Identify one end of the playing area as the 'food source' and the other end as the 'primary shelter'.
- iii. Mark with the help of the string or a stick, four to five pockets between the 'shelter' and 'food' zone. These represent additional shelter ('secondary shelter') for the prey and can be randomly distributed on the field.
- iv. Food tokens are placed in the 'food source' zone on the ground.
- v. The 'prey' will stand in the 'primary shelter' zone and the predators outside the play area.
- vi. At a whistle or clap, the round begins. The task of the prey animals is to move from the primary shelter to the food source, collecting two food tokens on each trip, and return to the primary shelter. Unless they collect two food tokens they die. Their route is hazardous, however. They need to be alert to possible predators. Prey have two ways to prevent themselves from being caught by predators:

they may 'freeze' i.e. stand still when a predator is one-and-a-half metre from them, or they may run to secondary shelters. Frozen prey may blink, but otherwise should be basically still and silent.

- vii. Predators start their activity anywhere in the open area between ends of the field and thus are randomly distributed between the prey's food and primary shelter. Predators must each capture two moving prey to survive. Captured prey are taken to the sidelines by the predator who captured them.
- viii. The activity can continue for upto five to seven minutes for each round of the game. Remind prey that they can remain frozen for as long as they like, but if they do not have enough food at the end of the activity they will starve to death. In Nature, an animal must balance the need to find food with the sometimes conflicting need for safety.
- ix. Play three to four rounds, allowing each student to be a prey and predator.
- x. Discuss with the students the ways they escaped capture when they were prey. Which ways were easiest? Which were most effective? What means did they use as predators to capture prey? Which ways were best? What did the predators do in response to prey animal who 'froze'? In what ways are adaptations important to both predator and prey? Ask the students to summarize what they have learnt about predator-prey relationships. How do predator-prey relationships serve as natural limiting factors affecting wildlife?

Variations/Extensions

- i. Conduct the activity for three or four rounds, recording the number of captures in each playing period. Have students who are captured become predators, and each predator not getting enough food become a prey animal in the succeeding round. This quickly leads to the concept of dynamic balance as prey and predator populations fluctuate in response to each other.

Oh Deer!

Objectives: To enable students to:

- i. identify and describe food, water, and shelter as three essential components of habitat;
- ii. describe the importance of good habitat for animals;
- iii. define 'limiting factors' and give examples;
- iv. recognize that some fluctuations in wildlife populations are natural as ecological systems undergo constant change.

Materials: An open space large enough for students to run; blackboard or flip chart; writing materials.

Procedure:

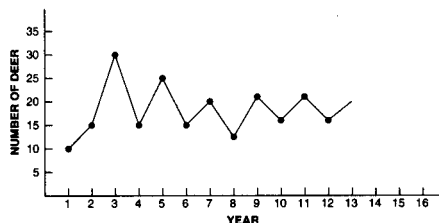
- i. Ask the players to call out 'one', 'two', 'three' and 'four' repetitively so as to form four groups. Ask all the 'ones' to go to one area; all 'twos', 'threes' and 'fours' go to one area each. Mark two parallel lines on the ground or floor, 3-5 metres apart. Have the 'ones' line up behind one line; the rest of the students line up behind the other line.
- ii. The 'ones' become 'deer'. Ask the students what the essential components of habitat are. Explain that these are food, water, shelter and space in suitable arrangement. Deer need good habitat in order to survive. Explain to the students that for the purpose of this activity, we will assume that the deer have enough space in which to live. The emphasis will be on food, water and shelter that the deer need in order to survive.
- iii. Decide upon hand gestures to symbolize the three basic needs-food, water and shelter as shown in the illustration. Once an appropriate gesture has been decided upon, it should be followed by the whole group.



- iv. The 'twos', 'threes' and 'fours' represent food, water and shelter. The deer will choose any one of these components that matches the symbol that they have chosen (i.e. the deer with 'food' symbol will have to find a food partner from the opposite line).
- iv. The activity starts with all players lined up behind their respective lines (deer on one side; habitat components on the other side)-and with their backs to each other (i.e. the deer and the components should stand with their backs to each other).
- v. Begin the round by asking all of the students to make their symbols.
- vi. At the count of three or at a whistle or clap, the deer must run towards the habitat line and each select the component it needs and stand in front of it. Each deer must hold the sign of what they are looking for, until it gets to the habitat component with the same sign. Each deer that reaches its necessary habitat component takes the 'food', 'water', or 'shelter' back to the 'deer' side of the line. This represents the fact that the deer has successfully met its needs, and may successfully reproduce as a result. A deer that fails to find its food, water, or shelter partner dies and becomes one of the habitat components. So, in the next round, the deer that died is a habitat component and so is available as food, water, or shelter to the deer that are still alive.
- vii. Record how many deer there are at the beginning of the activity, and at the end of each round. Continue the activity for approximately four to five rounds.
- viii. At the end of the activity, discuss the game. Encourage students to talk about what they experienced and saw. For example, at the start there was a small herd of deer that could meet its needs in the habitat. As the population of the deer expanded over two to three rounds of the activity, the habitat became depleted. As a result there was not sufficient food, water and shelter to satisfy needs of all the members

of the herd. At that point, some deer starved or died of thirst or lack of shelter, and they became part of the habitat. Explain that such things happen in Nature also.

- ix. Using a flipchart or blackboard, display the data recorded during the activity. The number of deer at the beginning of the activity and end of each round



represent the number of deer in a series of years. That is, the beginning of the activity is year one and each round is an additional year.

The graph will act as a visual reminder of what happened during the activity i.e. the deer population fluctuating over a period of years. This is a natural process as long as the factors which limit the population do not become excessive. The wildlife populations will tend to peak, decline, and rebuild-as long as there is good habitat and sufficient numbers of animals to successfully reproduce.

- x. Ask the students to summarize some of the things they have learned from this activity. What do animals need to survive? What are some of the "limiting factors" that affect their survival? Are wildlife populations static, or do they tend to fluctuate, as part of an overall "balance of nature"? Is nature ever really in "balance" or are ecological systems involved in a process of constant change?

Variations: Instead of drawing the line graph for students as described in ix, have the students create their own graphs. Provide them with the years and the numbers of deer. Depending upon the age group, they can make picture, line or bar graphs.

Who Am I?

Objectives: To enable students to:

- i. use deductive logic in identifying diverse elements of nature;
- ii. gain an insight into the characteristics of a particular element of nature.

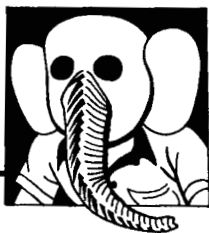
Materials:

- i. Name tags of different elements of nature like air, water, butterfly, fruit, seed, mango, soil, sun, etc.
- ii. U-pins or safety pins

Procedure:

- i. Ask the students to stand or sit in a circle.
- ii. Ask one student to volunteer. A name tag is fixed on the back of the student. It may be fruit, seed, flower, mango, tree, etc. The participant is not told what label he/she bears.
- iii. Now ask him/her to go around the circle and ask the other group members to read the name silently.
- iv. The student with the tag asks relevant questions regarding his/her identity. As the number of questions are limited by the group (say 20 questions), the student should be very careful in the choice of questions. He/she should focus the questions by framing them logically, e.g. based on classification of animals and plants. The others must answer questions only with either a 'yes' or 'no'.
- v. As the game progresses, one can bring down the number of questions to ten to make it more competitive.
- vi. After some ten to 15 rounds discuss as to how students arrived at the answers. Did they use any classification principles? If so, which?





Make Believe

Mamata Pandya

Children enjoy play-acting or making believe, whether it is putting up a play, watching a dance drama, or participating in a group song. Skits and dramas provide lively opportunities to take on different roles and play a variety of characters that are usually quite different from their daily lives. This enjoyment and interest can be effectively harnessed in a number of ways for environmental education.

Performances

Children can watch performances put by others. This could be a play, a dance drama, a puppet show or any other. Viewing a good performance may move, provoke and disturb audiences to look at the environmental realities around them in a new perspective. The teacher then has an important role in reinforcing and consolidating the messages conveyed by the performance. Thus a teacher must spend a little time to discuss and draw out lessons learnt from the experience.

Children can themselves participate in this activity. They can write a play and perform it, or compose a song and sing it. Not only is this an intense educational experience for the participating children, but also has a learning value for their audience.

Younger children can be given simple scripts with prescribed roles and dialogues. The outcome could be predetermined or left open ended for children to decide. 'Animal Court' (see page 30) is an example of such a script.

Preparing for and putting up a performance of any kind can teach the children the importance of group work, of practice, can encourage their creativity and bring out hidden talents. They can see how an environmental message can effectively be communicated to a wide audience.

An interesting way of using performing arts to sensitize children and to introduce environmental issues into the classroom was demonstrated through a school programme in Ahmedabad, started by the Darpana Academy of Performing Arts. The pilot phase of the project called "Jagruti", meaning awareness, was initiated in eight schools- four Municipal schools and four private schools.

The project planning was done through a workshop by CEE with the Darpana team. The first step was to identify topics. These were water, garbage, and energy. Based on the key concepts to be communicated, the Darpana team developed scripts for the three topics. An eight week action plan was worked out for each topic.

At the next workshop teachers from the eight schools, who would be implementing the programme, viewed the performance that Darpana had prepared and gave their comments and suggestions on the same in the light of how students would perceive it. The activity schedule was discussed and finalized here. The performance and schedule were modified accordingly.

The Darpana team began each module by a performance on the theme, which combined dance, drama, song and folk theatre. The performance served as a good starting point, attracting the students' attention, and involving them in the process. The dialogues and songs were used to reinforce key messages, and set the tone for the programme to follow.

Following the performance, the Darpana team held eight sessions of one hour each with one class (Std.VI) in the school. The activities included children conducting surveys, forming vigilance teams to check on waste (of water, energy, etc.), composing skits and jingles,

drawing and painting, and putting up a theme-based display and performance for other classes.

The Jagruti project thus demonstrated an innovative use of performance to spark off a powerful experience of empowering children to understand, and to improve the environment.

Photo: Sunil Jacob



Role Play

Another experience in make believe is Role Play. A role play creates a structured experience that is based on actual or real-life situations, e.g. the outbreak of an epidemic, or the adverse effects of pollution by an industry.

The role play usually deals with issues that have many dimensions, and are open to different interpretations. Thus this exercise is more suitable for older students. There are no set dialogues nor predetermined outcomes. The exercise is designed to bring out the fact that in real-life situations there are many actors, much complexity, and often no simple answers or clear-cut conclusions.

Strength of this Approach

- Role play can help focus on real-life problems or issues.
- Role play exercises can be designed so as to raise awareness or develop understanding of an issue.
- It provides an opportunity to consider the

many angles to an issue within a short span of time.

- Role play exercises increase students ability to take other perspectives, and develop problem solving and conflict resolution skills.
- The format has scope for spontaneous responses based on the participants own knowledge and experience.
- It is a simple low cost method. It does not involve much material or advance preparation.
- It is an approach that allows active participation by students.

The Teacher as Facilitator

The role of teacher as a facilitator is to ensure that the role play is an educational experience. Advance preparation is required to successfully see through a role play. This involves several steps:

1. Choosing a problem or issue that students will be aware of, and that would help to achieve the desired learning objective, e.g. How mismanagement of garbage can lead to health and sanitation problems, how many pressures there are involved in protecting a green area (park) in a city, or a national park or sanctuary.
2. Creating a well-defined plot describing in brief the problem/issue: The plot should be presented in a way that the actors will understand the various facets without making it too complex or too simplistic.
3. Developing character briefs for each actor in the plot: These should indicate the personality, motivation and likely reactions to the given situation. The brief, while creating an impression of the character, should leave enough room for the actor's own interpretation and improvisation. The brief should be clearly presented in simple language. Unnecessary details should be avoided. As the number of characters in a



plot will be limited, the plot needs to be worked out so that it naturally involves a number of observers/onlookers.

4. Preparing slips of paper for each role with the characteristics etc. clearly written.

Setting the Stage

- The teacher should explain the reason for doing the role play and what it is expected to achieve, in terms of the learning outcome/objective.
- The process should be described as well as directions about what the actors are expected to do.
- The teacher can read out the plot/scenario loudly and clarify doubts, if any.
- Role can be assigned to the different students — either by the teacher, or through students choosing their own roles. The teacher can try to give roles which depict a character which is quite different from that of the person assigned it. For example a quiet student could be given a leadership/dominant role, or vice-versa.

If necessary the teacher can individually brief the actors about the roles.

- Once the roles have been assigned and the role slips handed out, the actors should be given a few minutes to "get into" the character. Too much time may, however, hamper spontaneity.
- Emphasize that once the role play begins, the role of the observers is as important as that of the main characters. Instruct them to make a note of any actions/points that cause a change in the course of the scene, why a solution was reached or not reached, etc. But remind them that they should not make comments that would distract the actors.
- Once the students begin the role play, the teacher should withdraw quietly.

During the Role Play

As far as possible the teacher should not participate in the role play. But in case a particular exchange stretches for too long, or if the discussion is going off track, or gets too heated, or if there is a point where no one has anything to say, the teacher should tactfully intervene to bring the process back on track, or lead it to some conclusion.

After the Exercise

- Allow students some time to get out of their assumed roles and back to being themselves.
- Conduct a debriefing session in which the situation enacted is analyzed. Students — the actors as well as observers — should be encouraged to share observations, feelings and what they learned from the experience. They could describe how they felt while enacting their given roles and what effect their actions had. Parallels with real life can now be drawn. Other possible outcomes or ways in which the situation could have been handled can also be discussed.

Have Your Say!

The Scenario

Kridanagar Municipal Park covers an area of 15 acres consisting of a patch of natural forest, a small waterbody, a beautiful garden, and a children's playground.

The garden is surrounded by housing societies, a school and a slum. The garden is used for exercise and recreation purposes by the young and the old.

Patel Builders has purchased this plot for developing it into a hotel. The Municipal Corporator has come to lay the foundation stone of the new hotel. News about the takeover has reached the people in the neighbourhood. People get together to protest against this.

Imagine you are a resident of Kridanagar. Put yourself in the role of the person you are representing. Present your point of view on the situation, keeping in mind the character of the person you are playing.

The Roles

Municipal Corporator

You have been a corporator for the past five years and wish to contest again in the forthcoming elections. The Municipal Corporation is facing a severe resource crunch. Selling off the plot of land to the builder will enrich the Corporation's fund.

Builder

By setting up a hotel in this area you will be making a large profit. You have already used all means to acquire this plot of land and are willing to use all your political and other contacts to see the project through.

Reporter

You are a junior reporter in the leading daily. You are interested in promoting your career by doing a sensational story.

Retired Citizen

The park is your favorite place for morning walk and exercising. Your Senior Citizens' Group meets there every evening.

Housewife

You are a mother of two children. You are not happy about a commercial establishment like the hotel being in the heart of the residential area. The park is the only safe place in the neighbourhood for children to play.

Kridanagar Cricket Club captain

Your team practices regularly in the park. The park is to be the venue for an important match to be held two months from now.

Gardener

You have been working in this garden for the last 25 years and have raised many of the plants and trees in the park. You are afraid of losing your job when the park is taken over. You are worried about the future of your three children.

Slum Dweller

You collect dry twigs from the park for fuelwood. Your children play on the swings and slides in the evening because it is a free facility.

Research Student

You are an avid bird watcher and love the park. You have been engaged in the study of bird behaviour in the park for the past two years. You would like to complete this study and publish your research paper.

School Teacher

You teach in the school nearby. The park is a very important educational resource that you regularly use for teaching.

NGO Worker

You represent an organization conducting environmental education programmes. You believe that the park can be saved by mobilizing adequate public opinion at all levels.

Developed by Kirtida Oza

Animal Court

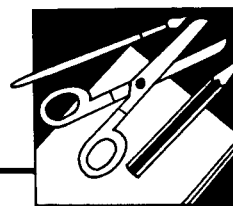
- MAN : To this green forest I have come
To look for the panther who has done
Much harm to me and my family,
Two of my goats he killed and fled
I search him now, I want his head,
Oh monkeys on the trees so high !
Tell me when you see him come by.
- LANGUR ONE : Brother we will thank you so
If you can help to kill our foe,
With quite an ease he climbs the trees
In search of his favourite food—monkeys.
- LANGUR TWO : My long-tailed clan has always feared
The panther more than the lion's beard,
For he can catch us where we leap and bound
In the branches high above the ground.
- TREE : We make the forest rich and alive
Offer food and home to many lives,
My tender leaves are the langur's lunches
Too many monkeys would mean bare branches,
The panther helps me stay healthy and green
By keeping the monkeys from stripping me clean.
- SNAKE : I know the panther is feared by all
But I must admit I do not want his fall
He helps my kind while on the prowl
By eating my enemy—the peacock.
- PANTHER : Surprised I am that you should argue
From so many different points of view,
I live my life as I was meant to
So what is wrong with what I do?
- MAN, LANGURS,
TREE, SNAKE,
PANTHER : We may talk on about this without end
Here comes the wise elephant, our friend,
Let's ask him to help us decide
What is wrong and what is right.
- ELEPHANT : Woven together in the web of life
We all need each other, so end your strife,
Each plant, each animal big and small
United we stand, divided we fall.
- Thus spoke the wise elephant
Now you decide, who's wrong and who's right.



After they put up the play, students could discuss the concept of web of life, interdependence, etc.

Library: More than Books

Meena Raghunathan



The school library could well become hub of environmental activities in a school. The library in-charge could encourage students in several ways.

Repository of Books

He/she could ensure that the library is well stocked with environment-related reading material suitable for the various age groups using the library. There is a growing range of books related to environment available today. These range from reference books to story books to popular quiz books. (see Page 32)

The library in-charge could also identify and procure material for teachers (see Page 33), which could help them focus on environmental issues in their teaching.

It needs also to be ensured that the library gets environment-related magazines/newsletters etc. (see page 10). Some of these may be available free or at a highly subsidized rate to school libraries from NGOs/institutions etc. It might be worthwhile to identify such local and national agencies and write to them.

Environmental Clippings

The library could also have a system whereby current newspaper clippings related to the environment could be displayed on a specially designated bulletin board. Different groups of students can be given the responsibility of doing up the board for each week.

Multi-media Facilities

If the school has TV/VCR or film projection

facilities, the library could also identify and procure relevant films. In schools with other facilities like computers, CD ROMS etc, the library can again act as the procurement centre.

Discussion Forum

Another activity that could be undertaken by the library is the organization of debates, quizzes, discussions, guest lectures etc. on relevant issues.

Project Work

The library in-charge can also give projects to groups of students. These could include reading and reviewing the environment-related books in the library; viewing and preparing synopsis of films, etc. The library in-charge could also encourage students to do secondary research by giving them projects, tasks and assignments which can only be done by referring to some of the material in the library. This is an activity that can be undertaken by children of all age groups. For instance, Std VI students may be asked to develop charts on the food habits of certain mammals. Std IX students could be asked to research the history of various monuments in their town/city and prepare tourist brochures for the same.

Children's Materials

The library could also become the repository of posters/charts/scrap books and collections prepared by the students. Library wall spaces could be decorated with some of these. The project reports could be read by future students and used as reference where relevant.

Books for Young Readers

Several publishers offer a good selection of interesting environmental literature, fiction and non-fiction for children. A book shop or book exhibition are good places to get an idea of the range and variety. You could also write to some of these for a list of such publications and other details:

- National Book Trust, India
A-5 Green Park, New Delhi - 110 016
- Children's Book Trust
Nehru House, 4 Bahadur Shah Zafar Marg
New Delhi - 110 002
- Centre for Environment Education
Thaltej Tekra, Ahmedabad - 380 054
- Centre for Science and Environment
41, Tughlakabad Institutional Area,
New Delhi - 110 062
- C.P.R. Environmental Education Centre
1 Eldams Road,
Chennai - 600 018
- Publications Division
Ministry of Information and Broadcasting
Patiala House, New Delhi - 110 001



Photo: Sunil Jacob

Some Useful Reference Books

- *The Book of Indian Birds*, Salim Ali, Bombay Natural History Society, Bombay
- *Book of Indian Reptiles*, J. C. Daniel, Bombay Natural History Society, Bombay
- *Common Indian Snakes: A Field Guide*, Romulus Whitaker, Macmillan Co. of India Ltd, Delhi
- *The Book of Indian Animals*, S.H. Prater, Bombay Natural History Society, Bombay
- *Encyclopedia of India Natural History*, R.E. Hawkins (ed), Bombay Natural History Society, Bombay
- *Endangered Animals of India and Their Conservation*, S.M. Nair, National Book Trust, Delhi
- *Some Beautiful Indian Trees*, Ethelbert Blatter and W.S. Millard, Bombay Natural History Society, Bombay.
- *Trees of India: A Popular Handbook*, Charles McCann, Periodical Expert Book Agency, Delhi
- *Field Guide to the Common Trees of India*, P.V. Bole, Yogini Vaghani, WWF-I, Oxford University Press, Bombay
- *Common Trees of India*, Pippa Mukherjee, Oxford University Press
- *What's That Bird?*, Kalpavriksha, New Delhi
- *Insects*, M.S. Mani, National Book Trust, New Delhi
- *Common Fishes of India*, B. F. Chhapgar, Oxford University Press, Delhi
- *Fishes*, Mary Chandy, National Book Trust, New Delhi
- *Oceans Omnibus*, Mamata Pandya, Meena Raghunathan, Centre for Environment Education, Ahmedabad.
- *The State of India's Environment 1982: A Citizen's Report*, Centre for Science and Environment, New Delhi
- *The State of India's Environment 1984-85: The Second Citizen's Report*, Centre for Science and Environment, New Delhi

Teachers' Materials on the Environment

Given below are some institutions engaged in developing environmental education material for teachers.

- Centre for Environment Education
Thaltej Tekra, Ahmedabad - 380 054
- C.P.R. Environmental Education Centre
1 Eldams Road,
Chennai - 600 018
- World Wide Fund for Nature - India
(WWF - I)
172-B, Lodi Estate New Delhi - 110 003
- National Museum of Natural History
Barakhamba Road, New Delhi - 110 001
- Centre for Cultural Resources and Training
(CCRT)
Bhawalpur Houses, Bhagwandas Road,
New Delhi - 110 001
- National Council of Educational Research
& Technology (NCERT)
Sri Aurobindo Marg, New Delhi - 110 016
- Central Institute of Educational Technology
(CIET)
National Council of Educational Research
& Technology (NCERT)
Chacha Nehru Bhawan,
Sri Aurobindo Marg, New Delhi - 110 016
- Bharati Vidyapeeth Environmental
Education Research Institute (BVEERI)
4th Floor, College of Architecture Bldg,
Bharati Vidyapeeth, Pune-Satara Road,
Katraj, Pune - 411 043
- Uttarakhand Seva Nidhi
Champa Naula, Manorath Sadan,
Almora, U.P. - 263 601
- Kalpavriksha
C-17/A, Munirka, New Delhi - 110 017
- Creative Learning for Change
S-268, Greater Kailash II
New Delhi - 110 048

Besides these, explore your own State to find out about institutions developing locale and language specific material.

Audio-Visuals on the Environment

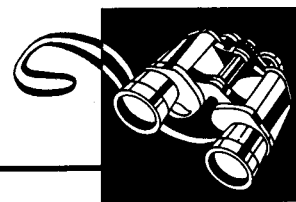
Given below are some sources from which slide shows and videos on environment may be bought or borrowed

1. Audio Visual Educational Resource Centre
Dadar Woollen Mill Lane
Kannada Mon. School
R.K. Building Taikalwadi Road Mahim.
Mumbai-400 016
2. World Wide Fund for Nature - India
172 B, Lodi Estate New Delhi-110 003
3. Alternative Communication Forum
A-11, Green Park Extension
New Delhi-110 016
4. Sanctuary Films
602, Maker Chamber Nariman Point
Mumbai-400 021
5. Tata Energy Research Institute(TERI)
Darbari Seth Block Habitat Place
India Habitat Centre New Delhi-110 003

The Television Trust for the Environment (TVE), is a non-profit organization promoting environment and development issues through broadcast television around the world.

TVE has a network of Video Resource Centres (VRC) in India, from where videos may be procured. They are :

1. Centre for Development of Instructional
Technology (CENDIT)
D-1, Soami Nagar New Delhi-110 017
2. Centre for Environment Education (CEE)
Nehru Foundation for Development
Thaltej Tekra Ahmedabad-380 054
3. Centre for Science and Environment (CSE)
Audio-Visual Unit F-6, Kailash Colony New
Delhi-110 048
4. Development Alternatives
B-32, institutional Area, Tara Crescent New
Mehrauli Road, New Delhi-110 016
5. ET & T Corporation Ltd.
15/48 Malcha Marg Chanakyapuri
New Delhi- 110 021



Dr. M. J. Ravindranath

Of the many objectives of Environmental Education at the school level, enabling students to participate actively in understanding, preventing and solving environmental problems is a key one. This by implication calls for teachers to plan and organize a variety of learning experiences, facilitating learners to observe and explore their environment, understand its related problems and issues, gather relevant information, and analyse it to arrive at possible solutions.

Environmental Education Resource Centre (EERC) in a school is visualized as a teaching-learning facility for students and teachers in pursuing EE activities. As the very name indicates, EERC is a resource base of materials on environmental education. It could be set up in any suitable and available space in the classroom. Where the facility is available, it could be set up in the library, or in a separate room. The resource centre could include a variety of resources such as:

- a) basic books on ecology and environment, magazines, periodicals, collection of newspaper clippings, etc.
- b) teacher and student materials like EE handbooks, activity booklets, workbooks, work sheets, etc.
- c) teaching-learning aids such as charts, models, posters, flip-charts, slides, photographs on environment, game materials, laboratory manuals and kits, herbariums, albums of bark prints, etc.
- d) low-cost equipment like hand-lens, microscope, balance, etc.
- e) materials required by children for preparing models, charts, etc.

- f) soft-boards for exhibiting the work done by children.

A well-equipped EERC in a school can serve many purposes.

As a learning facility, it can provide students with the scope of individualized environment to:

- read and enrich their understanding on environment and environmental issues.
- engage in environmental education activities and action programmes.
- observe, experiment and practice conservation ideas and techniques.

As a teaching facility, an EERC can help assist teachers in introducing EE content and skills through involving learners actively in the teaching-learning process, and provide learners with an opportunity to pursue their interest in environment and environmental issues.

A well-founded EERC in one school can serve a number of other nearby schools by sharing its resources and facilities. In other words, through one EERC, it becomes possible to provide many of the EE resources and facilities to a number of schools in the area, which otherwise would be expensive to provide separately to each school.

CEE's Experience

The concept of initiating and sustaining an EERC in clusters of schools was planned and implemented by CEE as a part of its wider programme of teacher training in Environmental Education under the National Environment Awareness Campaign (NEAC).

NEAC is a nationwide programme of the Ministry of Environment and Forests,

Government of India. It was launched during 1986. As a part of the campaign, every year a wide range of programmes are being organized throughout the country. These programmes include seminars, workshops, training programmes, eco-camps, rallies, *jathas*, dramas, etc. on environmental themes, aimed at creating environmental awareness in the general public including students and teachers, youth, women, factory workers, legislators, etc.

As a part of this environmental awareness campaign, CEE has been developing educational materials on the theme specified for the campaign, holding training programmes for personnel from State Departments of Education and voluntary organizations (NGOs), equipping them with the necessary information and skills for organizing teacher training programmes in their respective states, and following up the activities in schools.

During the year 1990-91, CEE adopted clustering of schools and NGOs in a given area for organizing EE training programmes for primary and upper primary school teachers; for guiding and assisting teachers in conducting EE programmes and activities in their respective schools; and for follow up and monitoring for feedback for further improvement.

More specifically, clustering involved training of NGOs interested in promoting EE in schools, encouraging these NGOs to identify 20 to 25 schools in their operational area (forming a cluster of schools) for training teachers, and providing them with necessary guidance and support for organizing EE programmes and activities. Initiating an Environmental Education Resource Centre (EERC) in one of the cluster

schools formed an important step of the cluster approach.

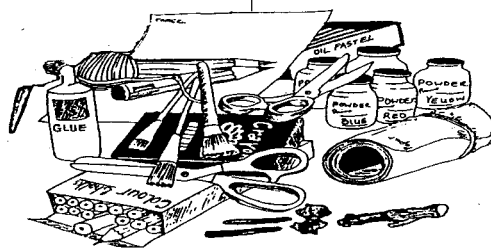
Over the years, CEE has formed several NGO-schools clusters, including EERCs, across the country. During monitoring of the cluster and EERC activities, it has been observed that:

- EERC as an idea/concept has been well received by the NGOs and cluster schools.
- resources of the EERC are used by teachers and students of the cluster schools
- EERCs have enthused teachers to organize several activities for students, such as poster and chart preparations, essay and painting competitions, model making, slogan writing, etc. on environmental themes, and these materials have in turn enriched the resource centres.

Learnings

As in many other sectors, education also suffers from insufficiency of financial and teaching-learning resources. This problem is more acute at the school stage, where the numbers involved are large. Schools without even basic necessities like blackboard, charts etc., are a reality.

CEE's experience with EERCs indicates that through establishing an EE resource base in one school, resources required for effective promotion of EE can be made available to a number of other schools in the area, enabling them to engage in EE. As the schools begin to work together in a cooperative manner sharing the resources, the schools can organize a number of inter-school EE activities benefitting a number of schools and children in the area. This may go a long way in breaking the isolation in which schools generally work.



There are many ways by which classroom teaching can be made more exciting and participatory. However, teaching and learning outside the classroom provides an altogether different experience. "Outside" the classroom does not necessarily mean going far away; nor does it always assume a trek or nature camp, although the value of these experiences is undoubtedly great. The outings need not take up too much time nor monetary resources.

A wealth of learning objects and settings are available everywhere: A walk around the school ground or neighbourhood; a few hours in a city park; a visit to a local historical monument; a trip to a museum, a factory, a public office ... any of these can provide rich opportunities for first-hand exposure and experiences. The challenge is to transform these into exciting, thought-provoking and answer-providing opportunities.

Properly planned, out-of-class experiences can help to enrich, vitalize and complement content areas of the school curriculum. They can provide the space for the development of several skills including observation, investigation, measuring, mapping, collecting data and analyzing it, critical thinking and problem solving.

The experience can be further strengthened if students are properly oriented before the outing about the purpose of the visit, and relevant concepts are introduced. This provides the common framework for the discussion on the experience and helps to reinforce and consolidate the learnings therefrom.

This section emphasizes the need for adequate planning in turning such opportunities into educational experiences; the importance for the leader to be able to facilitate a process of self-learning, rather than teaching; and the need for a different approach when working with out-of-school children.

That which can be learned in the classroom should be taught there, and that which can best be learned in the outdoors should there be taught.

Visits: Combining Education with Fun

Meena Raghunathan



Children often go with their parents or teachers to facilities like zoos, museums, botanical gardens, science parks, planetaria, etc. It is somewhat difficult during such a visit to strike a balance between 'enjoyment' and 'education'. Either it becomes just a picnic and the children are not enriched at all through the visit, or the educational activities are so over-stressed that the children do not enjoy themselves.

Through planning appropriate activities, the teacher can make such visits both fun and educational. Flexibility in approach, an informal atmosphere, and an activity-oriented approach to learning can help in this.

Here are some tips that may help teachers achieve this.

Setting Goals for the Visit

The teacher would first need to set explicit educational goals for the visit. These may or may not be directly related to the curriculum. They may be stated in informal terms, but it is important to state these goals.

Goals may include some of these:

'Through a visit to the zoo, to help children understand the concepts of form and function, classification, adaptations, predator-prey relationships, etc.'

'Through a visit to the specific monument, to help the children understand the architectural style of a given period'.

'Through a visit to the museum, to increase the children's appreciation of the skill of the craftsmen of the region'.

Planning the Programme

Having set the goal, it becomes possible to plan the programme. For instance, if the

teacher is clear that certain ecological principals are to be understood through a visit to a zoo, the route that is to be followed in the zoo must ensure that the appropriate enclosures are covered. If adaptations are to be the focus, spending time at the bird enclosures to observe different kinds of beaks and feet will help to illustrate the variety.

Guided observation at enclosures of hooved herbivores (e.g. deer) as well as those of clawed carnivores (tiger, lion, etc.) can set the stage for understanding how the form of feet, teeth etc. are linked to the functions they have to perform (e.g. claws and canines help meat-eating predators to hunt and tear their prey, while hooves and grinding teeth distinguish the grass eaters who have to run fast to escape the predators.)

It is important while planning the programme that it is not too rigid, and that it allows the children to explore new things that they see. However, a framework programme is essential.

In case the facility has the provision for making available the services of an Education Officer, it might be good to discuss the visit beforehand with him or her, and also have this person accompany the group.

Planning to Achieve the Educational Goals

A visit to a facility is an informal situation where children may not be in a mood to listen to lectures. Therefore, the teacher will need to plan different kind of activities to help realize the educational objectives. These may include games, quizzes, worksheets, exercises of observation, creative writing, etc. For example the teacher may take along worksheets to guide bird observation (A basic format is given on page 42). Or the teacher may ask students

to write a cinquain (see page 6) on any one animal/bird that they have seen at the zoo. Of course, sketching and colouring are always popular activities. These too could be more focussed, for example, by giving each child a single colour crayon/pencil and asking her/him to find out and draw one of the zoo creatures which is predominantly of that colour.

Before the visit, the teacher will have to plan these activities, and develop/keep ready the necessary materials (e.g. worksheets, drawing materials, camera, quiz questions, reference books etc.) to help carry these out. The teacher also has to read up and research on questions children are likely to raise. Some basic reference books (see page 32) could be useful for this.

Briefing the Children

Before setting out for the visit, it is important to brief children on where they are going, what they can expect to see, what the objective of the visit is, what the plan is, etc. While the educational objective is being conveyed, it is important that the 'fun' element of the trip is also emphasized, so that they are not put off.

'Do's and don'ts' for the visit need to be clearly spelt out to the children. It is important that they be given reasons for what they are being asked to do or not do, as this will help them internalize the behaviour. These may include safety tips, their actions at the place, e.g., not feeding animals at the zoo, or not playing transistors at the zoo, etc.

At the site children need to be given enough opportunity and time to make observations and

explore the facility, as well as 'complete' the programme. It is important to encourage them to discover and question everything they see.

There may be many unplanned 'lessons' in the visit, and it is necessary to explicitly point these out to the children and reinforce them.

After the Visit

A classroom period may be needed to consolidate the learnings of the visit. Such a session may include discussion, question-answer sessions, quiz, writing of a trip report, etc.

The experience of the visit could also be discussed in the context of particular lessons being taught in different subjects. e.g. food habits of animals, camouflage etc. in the science class; creative writing exercises in language class; habitats in a geography class etc. Games can be used to reinforce the learnings. 'Who Am I' (page 25) is useful to recapitulate and better classify all the creatures that students saw at the zoo. 'Predator - Prey' (page 23) or 'Oh Deer' (page 24) can help students to understand how the animals they saw in captivity would behave in Nature. A debate on the whether zoos are good or bad would help examine other dimensions of the subject.

This is one example of how an informal environment can become a rich resource for teaching and learning. Visits to such facilities provide the opportunity to interact with a real environment, not just pictures or words in books. They provide first hand experiences to see, hear and touch - experiences which may not be easily duplicated in a formal classroom.



Using the Outdoors

Ramesh Uttam



There are some people who the moment they step into the great outdoors became one with it. Many of us wish we could be like that. Such easy integration with nature does not come by merely desiring it, but through practice.

For most of us, the basic problem is not knowing where to begin and how to go about enjoying nature. We feel we must have sufficient knowledge about nature to be able to proceed. Knowledge however can be gathered as we gain experience. It is not so much knowledge about various elements and components of nature but the process of self-learning which is important. The key to the process is participation. In other words, the only way we can learn about, and enjoy, nature is by being there.

It is important to know how to proceed, rather than to have pre-knowledge. The secret lies in observing objectively, recording observations correctly and building upon observation to understand the processes of nature. In turn, observations and notes can subsequently be checked out through referencing relevant books or turning to experts.

To sharpen one's abilities, easiest aspects to begin with are plants, insects and birds. One need not go to a jungle to learn of them. These three 'basics' are available even in cities.

Where to Go

Outdoor activities, outings and field trips can be arranged within our very towns and cities. A wider variety of natural elements however is always found at the edge of the town or village and in similarly less disturbed (or undisturbed) areas. Choose an area with a variety of habitats like ponds or rivers, fields, managed or unmanaged woodlots, barren or rocky patches, natural grasslands, etc.

Before the Outing

Most of us think that such activities take a lot of time. These programmes can usually be conducted in the short span of a couple of hours, and seldom exceed half-a-day even when out of town programmes are arranged. It is necessary to plan each trip carefully.

1. Select the area you wish to cover– Leave behind clear route plans in case you are going out of town.
2. Choose your subject– You may wish to concentrate on one or more specific themes like Monsoon flora, Insects, Birds, Camouflage, Pond Life, etc., or you may like to observe everything on the trip.
3. Do plan for some leisure time in your outing, unless you enjoy rushing through the programme like an employed commuter!
4. Do remember to carry your pocket notebook and pen for on-the-spot notes. Any delay, in a majority of cases, results in our memory playing tricks.
5. Apart from the note-book you may wish to carry a magnifying lens, binoculars, camera, field guides or reference books etc. Carry your own snacks and water if necessary. Suitable rain-wear also should be part of your outing kit (in case you do not particularly enjoy getting wet during the monsoon).

On the Field

1. In order to perceive the subtler aspects of nature one must concentrate on using the sense of hearing. Avoid speaking amongst yourselves as far as possible, and concentrate on detecting nature by perceiving sounds. Transistor radios, musical

instruments and similar gadgets are city-based recreations and must be left behind.

2. We come outdoors expecting to see it in its natural state. You can help keep outdoor areas as you wish them to remain by depositing litter in the right place viz. the city's waste disposal system. In other words carry back your litter to where it came from.
3. Overcome the temptation to collect specimens or damage the environment in any manner. Many a time one quite unconsciously plucks a leaf or flower or even a blade of grass which may be seeding. We should realise that the flowers and seeds that we unconsciously remove are part of the survival of that species.
4. Another form of damage one must take care to avoid is trampling all over the place. By staying on used paths and trails one can ensure a great deal of conservation of our environment.
5. Outings provide an opportunity to use our otherwise neglected senses like hearing, smelling and feeling by touch. The sense of taste is not included since it may prove serious to the lay person.
6. Remember to write your field notes, not with the view of being like professional writers who produce wonderful works. Your attempts should reflect a personal joy of taking home memories of happy association and observations on the field.
7. The same goes for sketches. They add value to our notes and are not meant for art galleries.

After the Trip

1. A good test for every outdoor person is that no detective should be able to find any trace of your having visited the area. So leave the area as it was before you came.
2. Follow-up your observation notes by consulting field experts or library references



Photo: Sunil Jacob

for further, and usually interesting, information.

3. Plan a programme to observe the same area through all the seasons of the year. You may find notable changes by visiting the same area at least once in two months.

Joining an experienced field person is a good way, to begin. However, one can also begin on ones own and refer to expert(s) later. Such a strategy will reveal how objective our observations and recordings are.

Hints for plant, insect and bird studies are given to get you started.

A tree is a tree is a tree of course! But to whom? From whose view point? Think of it. The same tree means different things when viewed from varied perspectives. A teacher of languages could describe it poetically. For the mathematician, estimating the height, mass, weight, surface area of all the leaves, the shadows cast at different times etc., would work. The art teacher will see geometry, shape, size, proportion, light and shade, texture, colours, etc. The chemistry teacher will find different species have different chemicals predominating. The geography teacher can find out the soil types and tree relationships as also habitat preferences like well drained, moist, dry, wet, slopes, valleys, plains etc.

Hints For Plant Study

1. Study the shape
Mast/pole, umbrella, lollipop, triangle, inverted triangle (also tall/medium/short).
2. Touch and feel the bark
The texture - Rough, smooth; cracks, vertical, horizontal or both; or flakey, knobs, prickles, etc. Note and describe bark pattern also, if prominent.
3. Observe the arrangement of leaves
Alternate, opposite, whorled.
4. Look at stipules and/or type of leaves
Simple/compound; any speciality, tendrils, climbing organ, etc.
5. Feel the texture of the leaves
Rough, smooth, waxy, sandpaperish, prominent veins, etc.
6. See the shape of leaves
Associate with common objects like heart, arrowhead, spearhead, camel's foot, palm of a hand, etc., and sketch shape.
7. Estimate the size of leaves
Sketch shape and record dimensions using the metric system.
8. Observe where found
Describe habitat - in forest/farm, near stream/pond, or barren patches, high hill, slopes, ridges etc.
9. Look at type of arrangement of flowers
Single, cluster, raceme.
10. Find out when it flowers
Describe flowers — size, colour, shape, smell, nectar, etc. Number of petals, stamens and ovaries.
11. And when does it fruit?
Note seeds and method of dispersal if possible.
12. Name the plant
Ask a plant enthusiast if you don't know, or consult a reference book.
13. Find out economic uses
Edible/poisonous, medicinal, fuel, any other utility.
14. Check out life found on it
a) Plant-epiphytes/parasites/other
b) Animal - mainly insects and birds.
Do also look out for amphibians, reptiles and even small mammals.

Hints for Insect Study

Place _____ Date _____ Time _____
 Clear/Cloudy _____ Still/Breeze/Wind etc. _____
 V. Sunny/Sunny/Moderate/V. Shady/Shady _____

No. Insect types	Description (see Note 1)	Behaviour and Habitat (See Note 2)
1. Ant and Ant-like 2. Beetle Types 3. Grasshopper 4. Cricket 5. Fly 6. Bee 7. Dragon-Fly 8. Butterfly/Moth 9. Worms (Arthropods like worms scorpions, spiders, etc.)		
NOTE: 1) Observe and note size, outstanding characteristics, prominent colours, design, etc. 2) Behaviour - doing what - walking, hopping, flying, eating, fighting, calling (describe sound)		

Hints for bird study

A good birdwatcher keeps a regular field diary to make immediate on-the-spot notes of his observations. A delay of a even fifteen minutes might distort one's memory. Field notes are most conveniently made in a pocket-size diary and should therefore be brief. Here are the important points to be jotted for identification of a bird:

1. Date, time, place, weather

Note sun, cloud and wind conditions like very sunny, sunny, moderate, shady, still, breezy, windy, etc.

2. Size

Associate sizes with known species for easier recording.

- | | |
|-----------------------|--------------------------|
| a) Sparrow - 15 cms | g) Crow - 43 cms |
| b) Quail - 10-20 cms | h) Kite - 60 cms |
| c) Bulbul - 20 cms | i) Duck - 60 cms |
| d) Myna - 23 cms | j) Village Hen 45-75 cms |
| e) Pigeon - 33 cms | k) Vulture - 90 cms |
| f) Partridge - 33 cms | |

If the bird size is between a myna and a pigeon, it may be noted as Myna (+) or Pigeon (-).

3. Shape

Comparison of shape with well-known birds also helps in identification e.g.

Kite/hawk-like	Wader-like	Crow-like	Sunbird-like
Duck-like	Sparrow-like	Bulbul-like	Partridge-like
Crane-like	Pigeon-like	Jay-like	Owl-like etc.

4. Outstanding features

Crest, long legs, beak, tail, eyebrow, eye-mask, or any other outstanding feature that draws one's attention first.

5. Predominant colour and outstanding colour(s)

Colours of correctly named external features may be very helpful.

6. Common features

- a) Bill : hooked, straight, curving, upturned, spoonlike, long, short, thick, slender, conical, etc.

- b) Legs : long, stiltlike, short, feather covered etc.

- Feet : grasping, with claws/talons, webbed, elongated toes, etc.

- c) Tail : long, short, forked, square-cut, notched, racket shape, graduated, curving, etc.

- d) Eyes : colour, ringed, etc.

7. Activity

Feeding (note and/or collect food), singing, flying (note mode of flight - e.g. swift, slow, flapping, undulating, gliding, etc.), territorial defence, courting, etc.

8. Call notes/song

Songs are easy to remember if allied with some familiar sounds, words, phrases, etc. e.g. The Lapwing's "Did-you-do-it", or the Tailorbird's "Pretty-Pretty", or the Coppersmith's "Tonk-Tonk", etc.

9. Habitat

Evergreen forest, marsh, hill slope, stream, seashore, farm, etc. Also mention the exact place frequented by the bird, e.g. tree canopy, bushes, ground, rocks, water, etc.

10. Nest and nesting details

Should you be lucky to spot nests, do note the size, shape, location, outstanding, features, colour and other pertinent details from a distance and without disturbing it.

11. Other notings

Make notes of other aspects of behaviour. Birds may be found singly, in pairs, groups or in hunting parties with other species.

Draw a sketch map of the birds' territory. Notice if there is any "pecking order" or dominance among sociable birds. Birds may have camouflage patterns. Different birds of prey have separate hunting methods and their wing shape and tail are all adapted to it. Kestrel, Short-toed Eagle, Pied Kingfisher hover in the air before pouncing upon a prey. Notice how different small birds defend their nests.

There are unending joys in birdwatching.

Observation: Starting a Process of Self-learning

Santosh K. Gupta



Knowledge acquired through one's own observation has better chance of leading to a good understanding, and to changing attitudes about the environment, rather than knowledge acquired from other people, from books, media etc. Probably this is because first-hand observation leaves a more lasting impression on us than information transmitted through other means. Unfortunately it seems that people, especially children, have more faith in the written word and things told to them rather than in their own observations.

The situation is further complicated by the fact that sometimes the orientation of textbooks is different from what we, as environmental educators, want to teach about the environment. For example, one of the first lessons in biology is the difference between living and non-living world. In EE what we would like to stress is the relationship of the living and non-living. Another example is that of classification. Children are taught that they must learn to compartmentalize flora and fauna, rather than trying to see the strong links not only between flora and fauna, but of these with air, water and soil "the non living", and with mankind.

Observation for its own sake does not serve any meaningful purpose. The knowledge gained through observation needs to be linked to a holistic knowledge of the environment, which in turn has been accumulated through earlier experiences.

The Programme

This paper discusses an experiment where such an effort was made to link the process of observation and knowledge acquired therefrom, with an understanding of the environment as a whole. This was the Sariska Environment Education Programme (SEEP) — a

programme of CEE for school children living around a Tiger Reserve in Rajasthan. The goal of the programme was to make students aware of the value of this protected area for themselves and for others who lived there or elsewhere. The programme also tried to develop a methodology for effective running of this programme in schools, and after school time through *Balsabhas* (clubs/gathering of young people outside school). The *Balsabhas* were coordinated by unemployed educated youth of these villages.

As part of this programme, a nature education book series was developed. This was to help systematize the process of developing and using observation as an integral tool for teaching and learning about the environment. Here I would like to concentrate on the experience of the genesis, development and evaluation of the first book in the series, on birds.

The Process

Need Identification: At the beginning of the programme (SEEP), bird watching was one of the many activities identified by us which would help achieve the objectives of the programme.

One or two teachers with a group of 20-30 students used to go out of school to a nearby farm, pond or woods. I used to carry a book with colour illustrations of birds. No binoculars were used. Students had instructions to stop, stand still and not to make any sound when someone spotted a bird.

After seeing the bird and sometimes following it for some distance, questions were asked about the bird that had been spotted. For example - what was its name, colour, what was it doing? Did they know whether male and

female of that species looked different, and how? The students were to write all this information in their notebooks. The illustrations of the birds spotted were also shown to the students from a bird book. I also tried to attract the attention of students towards the linkages about which I knew—for example which birds ate insects which damaged specific crops. After initial orientation to such nature trails, teachers were supposed to conduct such programmes themselves.

The students liked this activity, and teachers too showed an interest in this. This activity was initially conducted with students of four schools. After running this activity for nearly six months we identified some issues that needed to be addressed:

1. Lack of access to good quality illustrations of birds which students could refer to.
2. Elementary information about birds and their links to the other elements of environment was not available.
3. Students needed to be properly guided on how to observe birds systematically.
4. Students wrote their observations in different notebooks each time. So all information was not available in one place when needed.
5. Some students were unable to buy a new notebook solely for this purpose, because their parents did not allow it.
6. Teachers' interest could not be sustained for long because of many problems typical to our education system.

To solve some of these problems, we considered several options:

1. Giving each student one hard-bound plain notebook to note observations
2. Verbally communicating information about each species, and asking students to write this in their notebook.

3. Printing sheets of black and white illustrations which could be cut out and pasted in the notebook by the side of the information about the bird, noted by the student.

Reviewing these options, we felt that if students had their own books and a set of illustrations, it would reduce the dependence on having the teachers present as a pre-requisite for doing this activity. As this idea was discussed and developed, we finally decided to develop a book that would both give the students some information about common birds, and guide their observations. Good visuals were planned as an integral part of the book.

Objectives of the Book

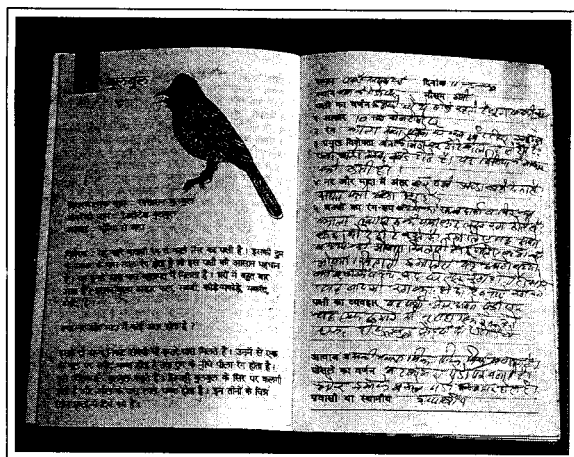
The Bird Observation Book was planned specifically to meet certain objectives:

1. To stress the importance of observation in the learning process.
2. To develop the confidence of the user in observation.
3. To develop the habit of systematically recording observations.
4. To motivate the user to learn more about flora and fauna.
5. To draw attention towards interrelationships in the environment.
6. To help the teacher/guide to initiate a process of environmental education with the students.

The Format of the Resulting Book

The book has three sections. The first part has information on (1) How to observe birds (2) Adaptations (3) Behaviour (4) Size, speed etc. of certain birds. (5) Information about interrelationship of the birds with other elements of nature.

The second section deals with 46 specific species easily sighted in the area. Some basic information and an illustration of each of these



birds is included. The information attempts to relate the birds to different elements of the environment and to man. The information and illustrations are limited to one page per bird. For each species, the facing page is left for students to note down their observations. The observation is structured by giving certain headings in the format itself, e.g. time when bird was seen; weather conditions; place where the bird was seen; size; colour; any striking feature; difference between male and female; description of young one; behaviour; sound/call; nest; whether migratory/resident.

Of the 46 species of birds included in this part, the species which are common appear first in the book, and the children are expected to provide more detailed information about these species.

The third section of the book gives details about families of birds.

Use of the Book

This book was given to nearly 1500 students in 12 villages situated around/in the Sariska Tiger Reserve (a protected forest). Students were in the age group of 11 to 15 years (Std. VI to VIII).

Use of the book was facilitated/monitored by teachers or young volunteers who were helping us in conducting environmental education activities after school time, and by myself.

As a first step, students in each class were introduced to the book. They were told about the different sections of the book. Also it was explained in detail as to how the birds should be observed. For example, the size of an unknown bird that was sighted could be compared to a common bird which is already known to the students, e.g. crow, sparrow etc. Illustrations of such common birds, in a range of sizes, were given in the book for easy reference.

After this introduction, the books were distributed to the students. Then the students were taken birdwatching around the school. At this time they filled up information about the birds which they saw. During the first few sessions, the books were kept at school and given to students only during the outings. Later on, the books were given to the students to keep, so that they could also note down any observations done by them individually. The books were also used after school hours by groups of students under the guidance of youth volunteers. Experiences of observing birds were then exchanged, thereby leading to greater learning.

The volunteers helped in coordinating EE activities after the school time through formation of clubs. These clubs also carried out other activities such as cleaning the village, counting people who brought fuelwood from the reserve etc.

Some Special Features

- This book is conceived as a self learning book
- Leading questions are asked.
- Good quality black and white illustrations for each bird and a few colour plates with illustrations of 24 of the birds are provided.
- Simple language is used
- The book can be easily adapted for use in other areas.

Evaluating the Experience

Evaluation was done by teachers, youth volunteers and ourselves in schools and during club activities. We mainly wanted to know:

1. Had the students learned the basic technique of observation?
2. Were they writing down observations?
3. Could they match the bird they saw with its black and white/colour illustrations?
4. Was the information provided for each species sufficient, too little, or too much?
5. Was the information on the families of birds really necessary?
6. Was the book helping to link the knowledge acquired through observation, to a more holistic understanding of the environment? We also tried to assess the role of the teachers and youth volunteers after introducing the book to the children.

For evaluation, we tried the following:

1. We observed the children when they were observing. We noted the level of concentration while they were observing, their interest in what they were doing, whether they talked to each other, whether they were writing down the observations on the spot.
2. We gave them plain sheets of paper and asked them to observe and record in our presence, without the prescribed information and headings to guide them. This was to test for systematic observation.
3. We gave them written questionnaires to fill about linkages in the environment.
4. We went bird watching with them, and on seeing a new bird asked them to identify it by its illustration from the book.
5. We talked with teachers and volunteers about students' enthusiasm levels, and

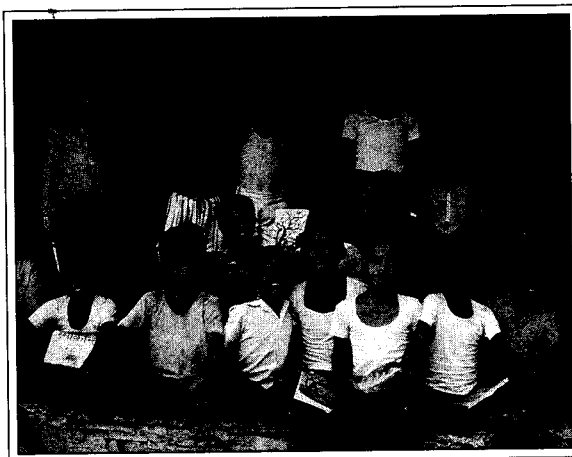


Photo: Santosh Gupta

discussed their own role in guiding the students with any help they needed.

6. We asked them about usefulness of information about families of the birds.
7. We also checked the physical condition of the students' books to get some idea about the extent of use.
8. The notings written in the books were also checked.

The Findings

1. Students showed enthusiasm about the activity. This approach of observation was new to them but they were keen to try it.
2. Almost 80 per cent of students filled up their books. Sometimes their observations exceeded information found even in standard scientific books — e.g. the observation that egrets eat mice. Sometimes they did write meaningless things, or copied from others, or tried to copy information from the other sections of the book to fill up the page.
3. Nearly 60 per cent students carried their books to schools on any particular day.
4. Most of the students still had their books at the end of one year.
5. Students' observation power is good. If one

asks pointed questions, this fact clearly emerges. But their recording of their observations was not very good. This may be attributed to the fact that their reading and writing capabilities left something to be desired.

6. Most of the times, students were able to identify the correct black and white picture after seeing the bird.
7. The understanding of links was good, especially in cases which were linked directly to their own life, e.g. drongo eating insects from the body of sheep.
8. Again and again, teachers and youth volunteers told me that the the students knew more than them. A clear indication that the process of self-learning had truly begun.

The Learnings

The development and printing of the book helped us to concretize and try out systematically the concept of observation as an activity that we believed was effective. Evaluation of the process of using the book, and feedback from users as well as facilitators gave us some useful insights. We discovered that in the earlier stages of the programmes, students needed more guidance, because for most of them this is a new approach.

We also learnt that after the initial guided trips and individual exercises, observations in a group situation were useful, as students learnt a lot from each other. Also, the group dynamics could continue into further activities.

With reference to the information given, users felt that information about the families could have been omitted; less information should be given about each species; the information should be even more related to the links in the environment. We found that more questions could have been included to guide the students on a path of self discovery. We have tried this in the second book of this series, which is about Mammals.

Looking Forward

We feel that the book given to teachers and youth volunteers as a guide, is very useful. If it is not possible to provide each student with a book because of resource reasons, then it can be used by the teacher/facilitator and students can be given plain notebooks and black and white illustrations. These illustrations can be pasted in the notebook and the information about each species can be verbally communicated which can be noted down in the notebook.

All in all, the experience served to reinforce our belief that observation is a first step towards an understanding of environment and that this understanding can help in changing attitudes.





Nature Trails

Ramesh Uttam

Climbing up the meadows through a riot of colourful flowers including buttercups, irises, gentians, rhododendrons, and strawberries, the group moves above the treeline into the snowscape. Another hour of climbing in the snow is punctuated with appropriate huffing and puffing with a groan or two thrown in; skirting a steep slope to reach the crest, and in a single breath all tiredness has vanished. A near-circular snow-covered lake nestling in the mountains at 4450 m above sea level is a sight to behold! After enjoying over an hour by the lake, the group heads back by another route to its tents in the meadows below the snowline.

This is just a glimpse of one of the nature trails in the western Himalaya.

A lot of observation of the trees, flowers, fast growing herbs and shrubs, insects, birds, geology, weather, geography, and track trails and signs, takes place on this trail.

What is a Nature Trail?

A nature trail is usually a beaten path especially through a wild region. It can be done on foot, by boat, on animal back, by bicycle, with an aqualung, or any mode of locomotion which is eco-friendly. Nature trails vary in length from as short as 50 meters to a hundred or more kilometers. The usual nature trails vary in length from 700 meters to about 8 or 10 kms.

Nature trails can be especially created, or existing paths in the wilderness can be used as they are. The created ones could be planned around a theme or central purpose. The existing ones like the walk to the crater-like lake provide opportunities for adventure, physical fitness, learning situations, interpretation and aesthetic enjoyment.

Nature trails can be either facilitator-led or self-guided.

Selecting a Nature Trail

Existing nature trails must always be surveyed for their strengths and interpretation possibilities.

A nature trail without a theme or clear objective is like a book put together with a page

or more from many other books. It ends up without a title and is disjointed and without focus and continuity. A few themes are listed for convenience. 'The story of a river'; 'Animal architects' covers animal homes; 'Tracks trails and signs' a detective type of trail; 'Rocks around the trail' – for geology; 'One for the birds'; 'Lil jointed legs' for arthropoda and insects; 'Plant pharmacy' for medicinal plants; 'Twenty tree trail' is an ideal one for urban areas; 'Wet walk' for pond study, and so on. The same trail can also encourage the group to enjoy it through the seasons.

Not only are the physical elements important on nature trails, but also the time element must never be lost sight of. The first perspective of time must be realised from the angle of seasons. Does the nature trail offer seasonal

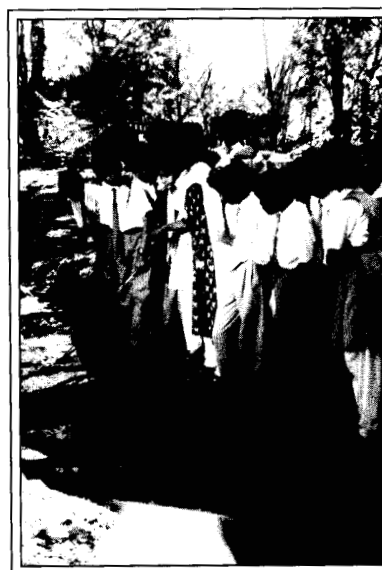


Photo: Sunil Jacob

variations like monsoon flora, or deciduous flowers, migratory birds etc.?

The second aspect of time is in terms of the participants' capabilities. Are the students capable of doing the trail in the time limit communicated to them? Where the nature trail is longish, then two options must be integrated in it. One is the need for 'rest points' set at appropriate intervals — longer in the beginning and shorter subsequently on same-day trails. The second option is for groups having difficulty continuing, to cut short the trail but to return by a different route. A good nature trail does not 'back-track' but is usually a large loop with one or more return loops, the simplest being like the figure 8.

Sufficient rest and water points are essential to accommodate a variety of visitors who may range from veteran hikers, to people with varying degrees of physical and even mental handicaps. Visitor safety must be integral to any plan. And care must be taken to protect the area from ecological damage. So routes must lead the students through interesting areas without destroying the delicate balance of nature in it. The aim is not only to educate and entertain - but also to control them from inflicting harm to the countryside.

Setting the Trail

A lot of preparation is required for a successful nature trail. In case of a facilitator-led trail not only must the facilitator know the history and geography of the trail, apart from its natural history, he/she must also know the art of interpretation and good communication. In addition to technical knowledge, he/she must also know first aid, what to do in an emergency etc.

Before setting out as a facilitator, check out whether any equipment is needed to make the trail more meaningful. Simple equipment like a magnifying glass or hand lens, a pair of binoculars, a thermometer and such, help a lot.

The self-guided nature trail must provide information to the group either through a hand-out folder, or through directional and information signage or a combination of both folder and signage. A lot of difficulty is usually experienced in producing a good quality 'self-guiding' folder; even more so for information signage which must not end up being text books on a wall or panel. An easy way out is to first conduct the trail as a guided one and tape-record it all. With good rewriting and editing, a folder can be prepared. Here too a number of combinations are possible. A basic folder used through the year could have seasonal inserts. The same holds true for the signage as well as the combination of both folders and sign boards used.

Trail Tips

Before starting out, check:

1. Is the topography — especially elevation changes — too difficult for the group?
2. Can the distance be covered in the time available? This may differ if the group is small or large.
3. What special conditions exist on the trail, e.g. wet conditions, stream crossings, insects, water supply, rest areas, dangerous plants and animals, ecologically sensitive areas, accessibility to medical aid in emergencies?
4. Does the area have enough variety to sustain the interests of diverse groups/visitors for an extended period of time?
5. Can the trail be conducted without creating unacceptable damage to the area? How much intense use can it stand (the area's carrying capacity)?
6. Is there adequate preparation to handle:
 - Medical emergencies (cardiac arrest, broken bones, bleeding, etc.)

- Encounters with animals.
 - Off-trail travel with map and compass
 - Fire
 - Sudden changes in the weather
 - Lost party members.
7. What equipment is relevant to the trail? Make a list of 'must have', 'should have', and 'may have'.
 8. Ensure adequate food, water and shelter for each member, for overnight trails. Visitors may be induced to lend a hand in packing, transporting, setting etc.
 9. Avoid dangerous situations. You may be experienced in handling them, viz., walking on a steep slope, but the participants may be new to it and it may therefore be dangerous.

Assemble the group at least 15 minutes before the time scheduled for the start of the nature trail. Explain the do's and don't's to be followed while on the trail. A sampling of these include instructions like:

- Please walk on the path only. This will avoid trampling on the grasses and young saplings.
- Walk in a single file (or in twos). However, the group will assemble closer wherever the guide signals a halt. This will enable everyone to observe the things shown and hear the guide.
- Do not litter the trail. Avoid eating sweets, chewing gum, snacks while on the trail.
- Maintain silence while on the trail. This enables us to hear bird, animal and insect sounds and identify the caller from it.
- Do question - but only after the guide is through with the presentation at the stop.
- Do observe on your own and make the best of the outing.

- If any member of the group anticipates or has any problem in doing the trail or needs special attention, please inform the guide.
- There are/are not rest and water points on the trail.
- You may/may not leave your packs/ luggage water bottle/snacks etc. behind. They are/are not safe here.
- Any other special rules and regulations to be observed during the visit.
- Inform the participants about the theme and a glimpse of what to expect - just to whet their appetite for it.

On the Trail

While on the trail, show and discuss things that will support the theme chosen. Involve the group, ask questions, and in general use a variety of interpretive presentation techniques.

Small groups are no problem, they virtually run the trail themselves. This is because of the ease of achieving personal rapport and ascertaining their needs — when to stop or move, how much information to offer, style of communication, etc. Larger groups require more time for starting, moving, reassembling and unless expertly handled, will end up giving the guide little time for interpretation. The pace must be set accordingly — not so fast as to be tiring nor so slow as to be boring. Like a good novel, there must be a story, it must have a setting (theme), and the suspense must rise, with small peaks and valleys of interspersed relief and rest.

After the Trail

When the trail is over, have a definite spot for dispersal. Let the group know that the trail is over. If the trail gets over away from the starting point inform to group how they can return. Or allow them to explore on their own. Perhaps offer to let some join you on the return trip to the starting point.

Tips to be a Good Guide

1. Be secure in your interpretive objectives to sustain the interest of varied groups for an extended period of time.
2. Be sufficiently experienced in outdoor abilities to gain the confidence and respect of the students.
3. Be capable of engendering positive group dynamics and bring out the potential in each visitor.
4. Create situations for self-learning by the participants.

Highlighting the Educational Experience

While on the walk, practice conservation- pick up a scrap of paper or other litter occasionally and dispose it properly.

Let students experience nature more, rather than being told about it all the time. Have a

point or an area in which total silence is maintained for a few minutes. The visitors will enjoy using other senses of perception and also enjoy some relief from your voice!

Involve the members in the interpretive process. Ask them to look out for things they can share with others.

The nature trail is a subjective experience, and no two persons will take back the same memories and experiences, and of similar intensity. The interpretation must therefore be varied to suit all temperaments and individuals — no two of whom are alike in looks or mental make up.

Let us learn to read the book of nature with joy, reverence and an empathy in the heart for all creation.

"The best school is life
The best teacher, experience
The best book is nature
The best temple, the heart"

Photo: Sunil Jacob



Mahim Nature Park — A Created Nature Trail

The location is Dharavi in Mumbai (Bombay), considered the largest slum area in Asia. Adjoining the Mahim Creek, is the Mahim Nature Park. Created on a landfill of Mumbai's garbage, the park has been set up by the Urban Development Department of the State Government. Apart from other facilities and infrastructure, nature trails are a major component of the park.

The park is based on the theme: "There is a web of life, we are a part of it". It has for its thrust areas: India's natural heritage, our cultural heritage, and progress or development which has brought us to our present state.

Under the natural heritage thrust, the attempt is to display the six major classes of forests found in the state. It naturally accommodates the succession of plant life from semi-arid scrub, grassland, dry deciduous, moist deciduous and evergreen forests on land and the mangroves in the creek. The associated faunal life is bound to occur as these habitats develop.

Also being developed in the five land-based forest types are huts peculiar to each of them. These link up with the resource base use and in a way demonstrate the economic cycles of each.

From the cultural view point, ancient Indian Science is juxtaposed on the trail. Our ancestors believed that all life is created and sustained by five basic elements viz, the *panch tatwa*. These are *Pruthvi*, *Vayu*, *Jala*, *Tej* and *Aakash*. Roughly translated they mean soil or earth, air or gases, water or fluids, fire or energy, and space.

The soil section will have nearly everything to do with earth sciences — rock types of India, soil profiles, soil analysis, and so on.

The air section (watch towers) overlooks the creek for observation of visiting birds, aircraft taking off from the nearby airport, instruments to measure wind direction, temperature, pollutants in the air.

The pond or water section provides for the study of that element, even a wind mill to pump up water into one of the forest types and flow down as the story of a river. It covers geography, hydrodynamics, principles of erosion and siltation,

dissolved oxygen, turbidity and other parameters, including lifeforms found in it, on it and around it.

The foregoing three elements are lifeless unless energy flows through them. Only then do they come alive and create and sustain life.

Without space none of these elements can exist. However, *aakash* or space is an abstract concept and a greater interpretation of it is crucial. It is apart from "space" also "spirit" or "soul" and makes for the differences born of varied reactions of separate beings to their environment.

Additionally, in the cultural context, our forefathers assigned a specific tree to each of the twenty seven constellations which are a part of Indian astrology. An astral garden has been created on the west side of the nature education centre building just at beginning of the other nature trail through the wooded area or arboratum.

Furthermore, taking Mahakavi Kalidas' epic poem *Shakuntala*, a scene from it has been depicted in which Shakuntala bids goodbye to the animals and plants she has grown up with in the ashram. A hut is surrounded by as many of the species of trees listed in the poem as possible.

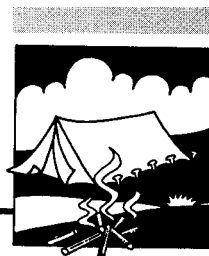
The whole park sits on nearly 5 hectares of Mumbai garbage. The hills and contours have been added on to the landscape. These contours help to increase the variety of plants possible on site realising that certain plants prefer slopes, others well-drained soils, and so on. The nursery, apart from reproducing and supplying saplings, also has an area especially for the display of live medicinal plants.

The east side nature trail through the five basic elements as well as the forest types could be a "guided" trail. The west side trail through the wooded area could be best used as a self-learning through observation, recording and referencing situation. It will call for a folder with numbered stops matched to the markers on the trail.

This then sums up an example of a nature trail "created" on a central theme and identified components which reveal the individual elements and also integrate them through guided interpretation.

Experiencing Nature

Lavkumar Khachar



Years ago, as a student peering down a microscope at the intricacies of cells, the chromosomes dyed to make them more visible, I had doubts about linking the inert objects with the dynamism and vitality of living protoplasm. Despite the tremendous advances in cellular research we have not been able to replicate life in scientists' test tubes. Even if the great breakthrough occurs, the synthetic blob of protoplasmic material would not be the same as substances of which the scientist was made, since it would not have impressed upon it the millenia of interaction with the environment, which generates a complex interplay of elemental forces and organic responses.

We can describe a beautiful sunset, perhaps project a flamboyant reproduction of one, but we cannot recreate its impact on an individual gazing at it in isolation across a vista of sea, desert or mountains. Different individuals would experience different responses. Even the finest of textbooks guided through by the most gifted of teachers fall short of experiencing Living Nature. How much more inadequate, then, must be the education of our children, given sterile classrooms, drab textbooks and harassed teachers?

Is there any wonder that a land so endowed with the material of intellect, the human brain, has so much mediocrity? We like to believe that we are descended of a civilization which nurtured intellectual giants, but fail to realise that those thinkers were leading unfettered lives in a land which was largely wilderness, and replete with the bounties of Nature. By contrast, today's child attending the most sophisticated of schools is cramped and provided a constricted vision. The child of yesteryears, while enjoying advantages of limitless horizons, enjoyed the benediction of

gurus who encouraged questioning. Today's child seems sentenced to ten years of a concentration camp governed by a syllabus as tyrannical and circumscribing as any prison code! The system, instead of exciting the wonder of growing minds, suppresses their flights as effectively as any efficient prison warden following the prison code.

In the mid-seventies, charged with the responsibility of developing WWF-India's Youth Education Movement, I contemplated the apparant lack of excitement among our youth for going out into the great open spaces. Comparing their upbringing with mine, I realized I had had the great good fortune of having spent my childhood at Hingolghadh with its wide views of the Saurashtra countryside, across which played the seasons, responded to by plants and animals. A majority of children, specially in urban situations, seldom see a sunrise! What struck me most was the immense gulf developing between a city child and a tribal child! Were we not creating a schizophrenic society? The thought was disturbing.

A Beginning

In 1976, during the southwest monsoon, principals of Saurashtra schools were persuaded to send children to Hingolghadh where, with the unstinting support of enthusiastic amateur naturalist friends, the first Nature Orientation Camp was organized. Encouraged by the enthusiastic response to the first Nature Camp at Hingolghadh, others were organized on Pirotan Island, till then known to very few people; and at Sasan on the outskirts of the Gir Lion Sanctuary. Nature Camps and nature education have since become part of the educator's lexicon, and subjects for deliberation at workshops and seminars!

A unique collaboration developed between the amateur conservationists and the Wildlife Wing of the Gujarat Forest Department; a collaboration which resulted in considerable conservation activism in the State. Not only were these nature camps supported by the State administration, they became annual events where schools, particularly in the Saurashtra region, began to regularly participate. It was during the period of this three-way collaboration between the Forest Department, World Wide Fund for Nature-India, and educational institutions, that several protected areas were established. Among others, the Hingolghadh Nature Education Sanctuary, and the Gulf of Kachchh Marine Sanctuary and National Park encompassing the mangrove and coral islands along the southern coastline of the Gulf, owe their existence entirely to the camping movement. Adjoining the Marine Sanctuary, the Khijadia Water bird sanctuary was also notified.

Those indeed were heady years! The state Government established the Gujarat Ecological Education and Research Foundation (GEER) at Gandhinagar and transferred to it a large chunk of land along the Sabarmati River near Indroda village on the outskirts of Gandhinagar, along with the newly notified Hingolghadh sanctuary. The State Forest Department and WWF-India co-sponsored a high profile seminar at Sasan in the Gir, presided over by the late Prime Minister Smt. Indira Gandhi. The early eighties were indeed intoxicating—too good to be true! That the enthusiastic cooperation did not continue for long is another matter. But one significant fact remained. In Gujarat at least, generations of school children have been strongly influenced by the exposure they received and nature camps are today very much a part of educational expectations.

Hingolghadh continues to be a bastion of conservation, with nature camps being operated at the fort by the Hingolghadh Nature Conservation Education Programme (HNCEP), a WWF-India initiated programme. The GEER

Foundation operates programmes at sites at Indroda Park, Gandhinagar and in the Hingolghadh Education Sanctuary. The State Forest Department adopted WWF-India's camp sites on Pirotan Island and at Sasan, and encourages nature camps in several protected areas. Camping is one of its activities which the Department takes considerable pride in. Like the environment, camping is most certainly the 'in' thing.

An achievement seldom acknowledged was the tremendous interaction between leading conservation organizations and the Wildlife Department, graphically demonstrating the capacity inherent within the existing system, provided there is greater cooperation. Unhappily, the tempo of collaboration could not be sustained, but the general apathy towards outdoor education has been dynamited with units at Hingolghadh, Beyt and Bakore well placed to act as vanguards to the camping movement.

The Educational Experience

At the onset, after we had got the Hingolghadh (tropical thorn forest), Pirotan Island (mangrove and coral) and the Gir (dry deciduous forest) camps operational, member schools were urged to send children in class groups—the youngest starting at Hingolghadh, where they were exposed to monsoon rains and the exuberant response to the rains by the plants and animals. Here they learnt about the prevailing sea winds bringing in low rain clouds and saw its effect on the wind-shaped trees. They also observed the water retention quality of extruded lavas and the limestone bedrocks below, quickly learning how vegetation responded to the quality of the soil. When the winds slackened, they experienced the oppressive moist heat and observed the formation of thunder clouds. Most of the discussions were conducted during cross country treks or while seated on some vantage point scanning the country below for gazelle and antelopes. During the few formal gatherings at the camp, children were

familiarized with snakes. Even as the fear of snakes was systematically removed, children were cautioned not to handle the reptiles since errors in identification could occur and bravado led to accidents. All the while, they were encouraged to ask questions.

The marine camps welcomed older children and here they watched the waxing or waning moons and observed their link with the Gulf of Kachchh, with its immense rise and fall of the waters. The mangrove forests with their unique adaptations and the outlying coral reefs provided tremendous material for education, intermingled with the pleasures of sea bathing and star gazing.

The camp in the Gir rounded off the forest exposure with a night out in the open, with sounds of wild animals wafting up with jungle breezes from the valleys below.

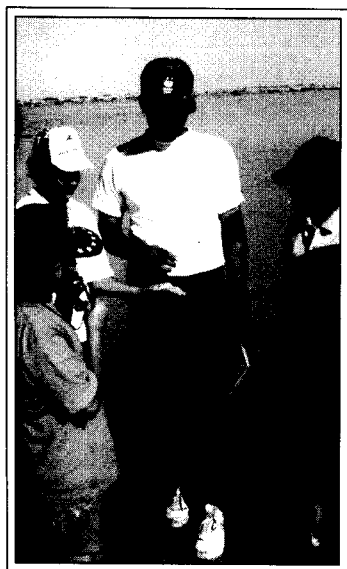


Photo: Rajendrasinh Jadeja

It must be stressed, however, that these camps were basically exposures to the natural world and

aimed more at developing an excitement and wonder for wildlife and the environment, and less to 'educate'. Those of us conducting the camps were creating a constituency for wildlife and perhaps our enthusiasm for the cause of conservation often made us gloss over the expected academic imperatives. Even so, the establishing of permanent camp sites and the organizing of annual programmes at other locations were important initiatives. Very imaginative teaching and learning experiences can be conceptualized in a manner that the

contents are of value both of a general nature, as well as locale specific.

The Momentum Continues

Centre for Environment Education, set up in 1984 has, through its Sundarvan Nature Discovery Centre, established permanent camp sites at Bakore in the Panchmahals (east of Ahmedabad) and on Beyt Island at the entrance of the Gulf of Kachchh thereby creating a tremendous potential to strengthen the camping initiatives. The Gujarat Nature Conservation Society, based in Vadodara has developed a Sundarvan type Nature Centre at its Shingrot property outside Vadodara and has recently taken actively to promoting nature education camps. Among the several groups formed by former participants of education camps at the Hingolghadh Nature Camps, the Surat Nature Club and the Ahmedabad Nature Lovers' Association (ANALA) are two of the better known groups organizing camps.

WWF-I's branches in other States of India started organizing camps in their respective areas and very soon other regional and local non-government organisations took to promoting camps for school children and youth as among their stated objectives. Thus, looking to statistical evidence, it would appear that in India schools have taken to the outdoors in a big way. Unhappily facts belie this rosy picture, since only a very miniscule number, especially from elite schools are involved. The vast majority have not been approached and even those that are on mailing lists, by and large, continue to consider the camping programme as a co-curricular activity.

All in all though, the then esoteric Nature Conservation Education Camp at Hingolghadh organized with the help of a few keen amateurs and the personal humouring of a former colleague by some school principals of Rajkot resulted in the acceptance of nature camping as an adjunct to education, as distinct from being considered mere pleasure excursions. It now remains for us to get our act in order.

Problems

The problems besetting such programmes emanate primarily from the organizers' side, and from that of the participating schools.

There are too few individuals to organize the operations. Running the camps for long periods for large numbers imposes immense strains on the dedicated volunteers. Organizations in whose names the camps are organised lack financial capabilities to sustain permanent staff and camps have to become self sustaining. Even before proper infrastructure is developed, expectations of financial returns must not become a paramount consideration, since this will heavily burden a valuable enterprise. Support is needed to empower the few highly motivated individuals prepared to operate the campsites, formulate methodologies and put together educational packages.

In schools, teachers by and large, hesitate to see the immense opportunities being made available for enhancing their teaching capacities. Often as not, they find it difficult to take on what they see as additional responsibilities beyond the call of duty. Unhappily, most schools, despite repeated requests, continue to treat camps as outings of a co-curricular nature. The education system, with its hierarchy and time evolved methodology, is perhaps the most difficult to penetrate.

Parents who should be the most keen to give their children the freshness of innovation, are understandably the most concerned about possible diversions of their children's time and energies — already heavily burdened by demanding academic schedules. Their concern is all the more understandable, given our own rather nebulous ideas of how to go about injecting outdoor programmes with academic discipline. At the best of times, it takes tremendous teaching abilities to guide a group of exuberant youngsters through an open air situation.

Even though I know that teaching much of natural sciences, geography and history can be effectively done outdoors, not many teachers can hold the attention of pupils, given the distraction on every side. Even so, those of us who have the confidence must deem it our duty to get children out of doors.

Fortunately, the commitment of the few who initiated the nature camps continues to be strong, and if efforts are concentrated on developing a few locations and greater interaction is continued with more sensitive school managements, a breakthrough can be expected.



Photo: Rajendrasinh Jadeja

The Way Forward

Right now, in Gujarat, and for that matter in a couple of other States, some of the finest locations have been identified. Those who have been conducting camps during the last two decades have gained immense insights. More significantly, schools are warming up to the idea of incorporating the programme into their normal schedules. It now remains to set into motion a crash programme of developing camp locations already in operation so that they have *in situ* facilities for handling groups on request, and increasing the availability of teaching aids both in the print and the audiovisual media. This is a task which will need considerable mobilising of talent and

resources,- financial and material. Ideas are being thrown around to get schools to get involved in adopting programmes and adapting them to complement the syllabus.

In any case, nature camps as educational experiences need to be easily accessible and it may not be possible for protected areas to service all schools, should we succeed in creating an enthusiasm into their alumni to the extent we hope to. The great success of the programme had been precisely because it started at Hingolgadh, where there were no pre-conceived reasons for going—other than to expose youngsters to the outdoors.

To induce more schools to get actively involved, a set of syllabus linked modules are necessary. The proposal to develop a camping site at Sundarvan, Ahmedabad specially for primary school children camping over weekends in near natural surroundings close to schools needs to be vigorously followed up. Available indications are that the response will be overwhelming. Two schools of Rajkot have agreed to make outdoor education integral to their methodology and several others bid fair to follow. If there are a greater number of teachers volunteering to help develop syllabus linked education material, and they are subsequently willing to help conduct camps themselves, this will considerably reduce pressures on the amateur naturalists who will nevertheless continue to be valuable resource persons and activators.

Nature education and associated camping activities are too much in a nascent stage for me to give advice to other educators, other than to welcome them to participate in our programmes. Like so much else in our society, we tend to be highly individualistic — yet very quickly institutionalize our activities. Both extremes are detrimental. Existing systems are rigid and there are far too many suspicions about anything that appears to demand a change.

Indian children, even in the best of schools, lack the levels of intellectual stimuli available

for so many in Europe or America. Our libraries are poorly stocked and textbooks are unimaginatively produced. Evolving syllabi based manuals for teachers ought not to be difficult given the encouragement available from government and the existence of institutions like CEE, specially started to prepare them. Before poor material is generated and gets into circulation, the teachers and educators who have pioneered the nature camps, must get down to seriously taking on responsibilities for evolving teaching manuals. The camping locations and camping programmes offer valuable potential.

It bears repetition that many of those who have initiated nature camping are highly individualistic. Therefore it would be advisable to encourage them to work on their individual concepts. We would thus accumulate some highly innovative concepts. At the same time, such identified individuals should be invited to interact with one another and with teachers individually and in groups to help generate more ideas. Even as these intellectual exercises take place, some other very concrete action is called for. The permanent camping locations should be developed into ideal teaching situations. Teaching packages for each site need to be conceived, along with the putting together of site-specific exhibitions and audiovisuals.

In conclusion, I may make the point that as often as not, we in this country, tend to put the cart before the horse. For instance, a lot of time and money is spent on methodology development of a general nature, but we fail to work on any worthwhile action project on the ground. A lot of extremely well produced literature exists on camping and nature study. With slight alterations, these can be made valid for Indian situations. What we lack are people who can lead groups and work fulltime in locations where programmes are to be operated. Our permanent sites are a step in the right direction but they are inadequately staffed and also need to be more intensively used. Hingolgadh-like campsites are launching pads, ready to be

used for the next stage in developing camping as a very meaningful experience, enriching the lives and exciting the curiosity of thousands of youngsters. Concerned educators must fully use these sites.

We are still in the very initial phase of developing nature camps as effective educative exposures and should not be too concerned about what is missing. There really is never a perfect education module and even if one was developed, in the field environment other options would offer themselves. So, let's get children out of classrooms, learning as our ancestors did, under the wide open skies.

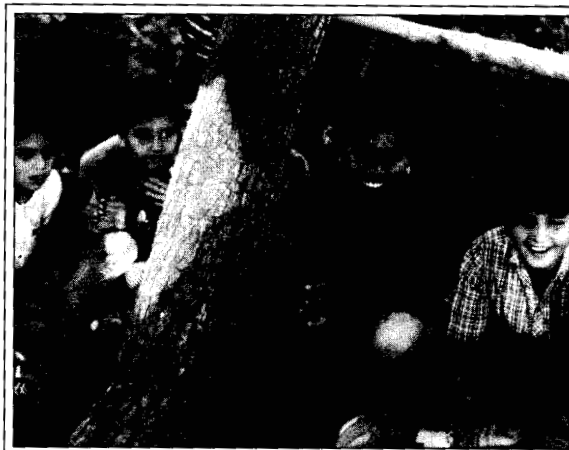


Photo courtesy: Nature Trails

Reaching Out - Camps for the Disabled

It is seldom that those of us who educate others realize how much we in turn learn from them. The process of teaching is, for a discerning teacher, a two way experience. In the natural situation, every exposure is a learning opportunity; the most exciting, though poignant experiences, are those of handling groups of blind, deaf or physically handicapped young people. Unhappily, we hesitate in organizing programmes for these groups; despite the fact that funding is readily available, demonstrating our poor sense of responsibility which makes us hesitate to take on what seem to be greater risks. I consider it my great privilege to have given these deprived individuals chances to be out in the wilderness through nature camps at different sites.

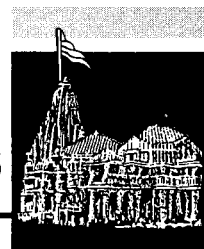
Each category of handicapped people have compensatory sensory and mental developments and watching reactions is an educative experience. One has to see a paraplegic race his wheel chair into the surf, a blind feeling the carapace of a crab or the whorls of a shell with absorbed concentration or a bright smile lighting a face seriously watching the sign linguist as she explains how the moon

raises the waters of the sea to realize how much our children, even with full faculties, miss in traditional education situations. But, what amazes me the most are those with physical handicaps - their determination to do things is often breathtaking. Having to live daily lives with greater effort than the rest of us, their responses tend to be that much stronger. The determination, they show is amazing.

I will end by what I started my talk to a group of handicapped adults - "At first glance, we feel sorry for you, but you are more fortunate than the vast majority of your fellow human beings who despite being blessed by whole bodies are physically, mentally and emotionally handicapped - the joy I see on your faces at being under the stars proves how great our links with Nature are and, how inadequate are our programmes". And I had concluded by " I have to thank you for being here to show me how correct it is to provide individuals such opportunities to expose themselves to the uplifting experience of being close to the natural world."

Cultural Trails: Understanding our Cities as Living Entities

Madhavi Joshi, Gopal Kumar Jain



It is important to know one's past to understand one's present. History, as we were taught, involved tediously memorizing numerous dates and the many dynasties that ruled. The parts that were easy to recall were events which had stories linked to them. Imagination would soar and one would be transported into another world. But this did not often happen; usually it was classroom lectures and long unending paragraphs to memorise that didn't make much of an impression. More and more, history became a subject we studied for our examinations and later forgot. But does it have to be so?

Urbanization brings with it increased development of technology and commerce. With it come modern amenities that make life comfortable. It tempts people to give up lifestyles that may have been environment-friendly but not so 'comfortable' or 'convenient'. It also means a fast-paced life for people in a mad rush to progress, with no time to dream. Cities, unfortunately, exemplify such a state of affairs.

"The personality and character of a city are not built in a day or even a decade. It is the result of centuries of growth in new directions, along with the preservation of historic structures, that gives a sense of identity to a city or to a part of it. If historic structures are constantly replaced by new ones, a place would lose its identity and character. Such a loss would not be restricted to the place alone, but would affect the people as well".

(Ahmedabad Reference Reader for Studio Project: Urban Core Revitalization/ Redevelopment Context: Ahmedabad - Manekchowk to Riverfront: 1995).

It is possible to save our cities from imminent death by making people aware that these are living entities, evolved over a period of time and how we as individuals are part of them. Conservationists need to have a strong understanding of history. This article discusses the development of a sense of history in an urban context through cultural trails.

Know Your City: Cultural trail

With the above considerations in mind, Centre for Environment Education embarked upon a pilot project of establishing a cultural trail in Ahmedabad.

About 300 students from five schools and participants of Training in Environmental Education course at CEE participated in the pilot trials organised for a week during December 1995. The trail provided the participants with information about historical layers of Ahmedabad, from the time it was set up on the eastern bank of the Sabarmati river by Ahmad Shah in 1411 AD, to the end of his rule. Emphasis was on how youth can contribute to conserve the culture and heritage of their city.



Photo: Gopal Kumar Jain

The Making of the Trail

The following elements went into the making of the trail:

1. Background research

The discovery of any city should logically start from going back to its very beginning. Therefore it was decided that the first trail would deal with the period between the founding of Ahmedabad in 1411 AD by Ahmad Shah, to the end of his rule. After library research and discussions with experts, five monuments which are significant landmarks of that period were identified.

2. Planning

Route : Chronology of the historical events decided the route for the trail. The trail began from Ahmad Shah mosque, went on to Bhadra fort, Teen Darwaja, Jami Masjid and Sidi Said mosque.

Prior permissions: Since the trail involved visiting the monuments and their precincts, we met the Committee looking after the mosques beforehand, with detailed information about the educational purpose of the visit. Archaeological Survey of India was also contacted for arranging to open certain areas of the monuments generally closed to public. Information about the trail was given to the police department also.

Content and information input: At each of these sites, a resource person would explain the salient features about the architecture, historical importance of the site, and the conservation aspects.

Other general instructions: Certain norms of behaviour inside the monuments were established beforehand to convey the message of respecting all religions. There were other instructions about the trail and expectations of the team and so on.

Participants: Schools where CEE's eco-clubs

were functioning were contacted and informed about the proposed trails. Students from these clubs were the participants for the pilot trails.

3. On the trail

Prior planning and research made the trail very exciting. A booklet provided more detailed information on the sites visited. It took nearly three hours to walk from the first to the last site. The discussions were lively and the participants were very curious. The team along with the participants learnt a great deal on the trail.

The Educational Experience

A trail is indeed a way of bring people closer to the city they reside in and its various facets such as the history, art and architectural forms and their relevance today. It is an experience of learning through observation, listening and assimilating the information.

The main features of this approach

- A route is predecided in consultation with subject experts.
- Participants have to walk down the route, which gives them time to absorb the surroundings.
- A subject resource person accompanies the participants to help them make connections between the past and the present.
- The participants realise that it is a serious approach to understand the city and not a picnic, as the emphasis is on learning through interaction.
- There is an emphasis on bringing out the present day relevance of some of the structures built during an earlier period.
- Participants can actually see and feel some of the facets of the city's heritage.
- Participants can also see the ravages wrought by time and development on these monuments.

Strengths of the Approach

- Participants absorb concepts related to history easily through interactive group processes.
- Outdoor education, learning 'on site' through observing, touching, feeling and interacting with a person who is willing to answer questions makes the experience a very useful one.
- Actually visiting the monuments and understanding their architectural and historical importance creates a lot of curiosity in the minds of participants who have probably never seen these places in that context.
- Three hours may be a short time to understand history but is enough to open a participant's eye to a new perspective to it.
- The need to conserve monuments and such places which tell us about our history can be conveyed through trails such as this one, as one not only observes the architectural grandeur of these structures but also other developments, and destructive activities around them.

Difficulties

- a. Before participating in the trail, students feel that it is just another way of teaching history. Since very few of them are interested in history, students do not volunteer. It was only after the first few 'brave visitors' who ventured on the trail gave good reviews, that other students showed interest.
- b. Large groups, especially from a primary section, are difficult to manage on busy roads teeming with traffic.
- c. Shopping is a major attraction, especially with adults, as the main city bazaar is in the vicinity of the sites.

- d. Since our resource person was elderly, he found it difficult to walk down to the sites with the group. To conduct such an exercise regularly, we realised that an alternate solution was necessary, one which could utilise his expertise, but not tax him too much.

Learnings

- a. Prior planning needs to be meticulous for a trail to be conducted smoothly.
- b. The format and content of the trail must be structured according to the target group. For example, students from primary school enjoy more anecdotes, stories or myths surrounding these sites; secondary school and higher secondary students would like some factual information along with these stories. Adults are more interested in factual information.
- c. An information booklet, well illustrated and having maps and a little text, is a good take-home reference material.
- d. Feedback of participants about the learnings on the trail must be taken to maintain the seriousness of the exercise.

Expansion

While the 'Ahmadshahi Ahmedabad' trail continues, two more trails, one on *pol*s and the other on the wooden architecture of Ahmedabad were added the following year. The trails were planned for weekends from September to February.

After an intensive orientation exercise with experts, three student resource persons from the School of Architecture, Ahmedabad were trained to conduct the trail.

A slideshow was developed, introducing the importance and joy of knowing the city as it was centuries ago. This was shown to school and college students inviting them to participate in the trail.

The Monuments

Ahmad Shah mosque: Situated in the heart of the city, this mosque was built in 1414 AD by Sultan Ahmad Shah from whom Ahmedabad gets its name. The mosque was for exclusive use of the royal family and a part of the fortified enclosure. Besides historical details of how Ahmedabad came into existence, participants were very curious about the concept and classification of monuments into *kabar*, mausoleum or *makbaro*. They were also interested in the significance and precise locations of various parts of the mosque such as the *mihrab*, *mimbar*, the ablution tank, the open courtyard and the pillared appearance. Through discussion, the link between structures built during a period and the social and cultural realities of that time was established. The large courtyards of the mosques with colonnades are for example, an Islamic architectural influence, while the carvings on the pillars and inside the domes, reflect Hindu influence.

Photo: Manisha Sheth



Bhadra fort : The citadel originally encompassed an area upto Jami Masjid. The fort has undergone a number of transformations over the years. The fort gets its name from the Bhadra Kali temple built in the northern wall during the Maratha rule. The southern wall of the fort was demolished by Azam Khan (also known as *Udhai* meaning 'white ant' as he was a prolific builder) to build a *serai*. The *serai* was the residence of a Maratha chieftain during the Maratha rule and later converted into a jail by the British. Bhadra has many stories associated with it. These also tell us how time and man have ravaged the once powerful citadel. Development of residential areas and modern structures have completely engulfed the once majestic structure, a seat of power in these parts. Bhadra today is known more for its temple, the offices and the government book depot within its premises.

Sidi Said mosque: The last mosque built during Ahmad Shah's rule is famous for its two *jalis* with intertwined tree and foliage designs. Today, it is a traffic island in the heart of a busy area of the city.

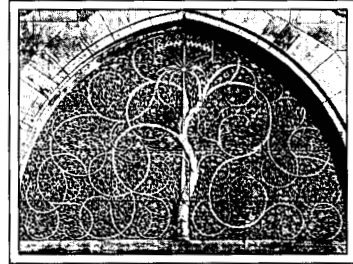


Photo: Bala and Manvita

Jami masjid: Built by Ahmad Shah for public use, it is located in the east of *Teen Darwaja*, the main entrance to the palace. It is a majestic structure unimaginably serene and peaceful, in the hustle-bustle of the city. The mosque courtyard also has a large underground tank to collect and store rain water as was the practice then. These concepts are as relevant today as they were centuries ago.

Teen Darwaja: The main gateway to the palace was the entrance to the palace from the residential and commercial area of the old city. *Jami Masjid* is on the same road on the eastern side. *Teen Darwaja*, generally closed to public was opened for the trail participants. It also is not free from being encroached upon, with roofs of houses almost touching the walls of the gate. Children from neighbouring houses just jump across to play on the terrace-like roof of the *Teen Darwaja*, unknown to the security guards posted below. The gates in earlier days also performed the function of ensuring the security inside the fort. *Teen Darwaja* is one of the few structures existing almost intact since Ahmad Shah's time. Today, it is known more for the shopping opportunities it offers. It has unfortunately become just one of those old structures standing in the midst of overflowing crowds, with people walking past it without a second glance.

Photo: Shilpa Ranade



infrastructure for children who otherwise cannot attend formal school.

- Developing in children a healthy outlook towards the forest that they interact with.
- Channelising the creative energies of young children which in an ordinary rural context get otherwise dissipated or suppressed.
- Building up, in the long run, a resource centre for education and information not only for children but for the adults as well.

These centres, experimental in nature, were expected to generate adequate experience in developing materials, programmes and activities with children in this area. Almost inevitably a large number of regular school-goers would also gather at the centres in breathless anticipation of the fun. The school goers were therefore also included in the games and activities.

Activities with Children

One of the first lessons we learnt with children of this area was that standard environmental and science education activities, materials and ideas which are readily available, could simply not suit the children's needs. Their limited exposure, illiteracy and a tough physical existence made it necessary for us to use different approaches, and re-think the content of our programmes. A lot of what we did with the children evolved through continued association with them rather than from a pre-determined programme plan.

Songs and Poems

Several simple poems in Hindi and Rajasthani were used for recitation with the children. Children are extremely adept at folk songs. We adapted a few songs and they became extremely popular with them. The themes of the poems and songs included rains, forest, wildlife, etc.

Children were encouraged to enact poems and

this was an extremely enjoyable time for all. Children were also asked to develop small, simple rhymes which were illustrated and pasted on walls.

Drawing and Painting

This was a regular feature of the centres and a most fascinating affair, drawing out a lot of imaginative efforts. The children were asked to draw individually and they were encouraged to use their imagination. It took a while before children could be accustomed to using crayons and pencils on paper.

Games

There was a constant demand from children for group games. We developed a few educational games for improving memory, reflexes, observation and deduction. The most enjoyable games were those that involved the children in running, struggling and tripping over each other in a heap.



Photo courtesy: REDPro

Theatre

Theatre activity was a novelty indeed for the children. We developed a few short plays and skits which would be rehearsed regularly. The themes of these skits were usually environmental (e.g. catching the wood-cutters, encounters with Forest Department etc.) Theatre brought out creative talent of the children and proved to be a great tool for building

confidence. The plays were much appreciated by the adults of the village.

Group Excursions

The children of the centre were frequently taken out to neighbouring forest areas. The outdoor opportunity was good for sharpening children's observation of their immediate physical surroundings: the wildlife, trees, state of overgrazed pastures, hills and water bodies. Bird counts and identification, leaf collection, seed collection by children were common activities.

Outdoor observations were always a good starting point for further discussions on interdependence, vanishing forests, and general environment.

Prakriti ke Mitron ki Phulwari

In a small township like Sawai Madhopur, it is difficult to have ready access to good books, games and material for young children. In addition to the children's centres in villages, we had also formed a club of children in Sawai Madhopur town. From the club and centres in villages originated a magazine called the *Prakriti ke Mitron ki Phulwari* which is a fun-filled collection of environmental stories and information, and which also tries to provide an outlet for the creative instincts of the children.

Phulwari's objective is to give information about environment to children in an interesting manner and to encourage their artistic and creative talent.

Phulwari began in a cyclostyled format containing stories, poems, drawings by the children of the clubs. And it was distributed to the children there. Over a period of time it has become a proper publication. The present format is offset printed, with a lot of illustrations and an attractive layout. It is being sent to the schools in villages around the Ranthambhore National Park, in Sawai Madhopur, children of the clubs and to other organisations which are working with children in Hindi speaking regions.

At present *Phulwari* contains stories and poems written by children as well as from other sources, illustrations appropriate for the stories and poems, competitions, a few activities to enhance the creativity of children, etc.

The themes for the contents of *Phulwari* are mainly environmental. The language of *Phulwari* is Hindi and we plan it to be a quarterly.

Children of the Ranthambhore area, like children all over the world, are extremely creative and have an unending curiosity. To work with them continues to be a source of inspiration and delight for the team.

प्रकृति के मित्रों की

फुलवारी

केवल निजी वितरण के लिए



पर्यावरण शिक्षण केंद्र, सवाई माधोपुर द्वारा प्रकाशित

As teachers most of us are most familiar with the traditional chalk-talk-textbook formula for teaching and learning. For hundreds of years, these have been the tried and tested tools for education, and continue to be the foundation of the educational process.

Today however, the range of educational media has widened considerably. The educational potential of electronic media is being exploited in a variety of innovative ways. Video, film, television, computers, Internet — all these offer the possibility of bringing the world into the classroom.

The use of a variety of media and exploiting the strengths of the new ones, become especially relevant in the case of environmental education. The very nature of EE — its multidisciplinary, its multiple audiences, its life-long role, its linkages between the past, present and future — all these and more such characteristics, invite the exploration of a range of options to achieve the goals. Different media provide some ways of taking students through experiences which otherwise they would miss out on.

Every medium has its particular strengths, and these need to be carefully considered in relation to the objectives for which it is to be used. TV, drama, puppets, songs, exhibitions are inherently attractive media. The very format invites and involves spectators. They are also especially relevant when dealing with audiences with low-levels of literacy, or in non-formal or out-of-school situations.

This section emphasizes once again the key role the teacher or facilitator plays in making sure that the use of these tools accomplishes the educational expectation. For this, planning is important. Whether it is a visit to a *mela* or exhibition, a video viewing, seeing a puppet show or a dance-drama, students will need to be suitably oriented to the context in which they will be seeing these; the experience needs to involve students' participation at some stage of the process; and a consolidation of the learnings therefrom should be an important element. The section also discusses an experience of developing EE programmes and materials for the visually handicapped — a different way of opening up the world to a special group.

Exhibitions are not Posters on the Wall

Meena Raghunathan, Sunil Jacob



Exhibitions are popular with schools, colleges, NGOs etc., as a means of creating awareness. In a school or college context, an exhibition has a two-fold educational value: those who create and put it up have to do a lot of research, writing, design, organization, etc. Therefore it is a very major learning experience for them. Those who come to view the exhibition get the message and therefore it is a learning experience for them.

Sometimes however, students who are developing exhibitions are constrained by various factors: lack of information, lack of a proper conceptual framework, lack of a particular skill such as illustration or writing, lack of resources etc., which may reduce the quality of the exhibition.

On the other hand, in a school situation, where large groups of children are brought to view the exhibition, it is often found that most children read the first few posters or panels and then just walk past the remaining panels without seriously looking at them. They are often distracted and since they are in an out-of-class situation, more in the mood for fun and games than of learning.

CEE's experience of developing 'Act Now', an exhibition focussing on urban environmental issues, and addressing what individuals can do to improve the environment, attempted to address both these issues.

Act Now Exhibition: Genesis

In 1993 Centre for Environment Education (CEE) was asked by the Ministry of Environment and Forests, Government of India, to put up an exhibition at the India International Trade Fair. This exhibition was to be part of the Ministry's theme pavilion on 'Environment and Development.'

The first step was to decide upon a theme suitable to the venue and the expected audience. An International Trade Fair was bound to attract a wide range of visitors — families, business delegations, general public etc. This pavilion also had a programme whereby organized school groups could visit during the mornings when the fair was not open to the public. We also realized that the average visitor would not generally be in a serious mood.

After a lot of brainstorming we decided that we would introduce the theme through concrete issues and examples that everybody could relate to. For example garbage on the streets or pollution due to traffic, as opposed to the more abstract issues like ozone depletion or greenhouse effect. We also realized that even while choosing such issues, it would be important to relate the causes as well as possible solutions to individuals. This is because while people are aware of the seriousness and urgency of environmental issues, they feel that they, as individuals, cannot do anything to mitigate these. Rather they put this responsibility on government bodies, industries, research institutions, etc.

Thus an exhibition was planned, which would attempt to create awareness about aspects of the environment that affect every person, and also give suggestions on some actions that could be undertaken in everyday life to tackle these. These would contribute to either actively improve the quality of our environment or at least reduce the negative impact on it.

Considering the wide range of expected visitors, it was planned that while there would be something for everyone, the experience would be primarily for the organized school groups visiting the fair.

The Exhibition

The exhibition was designed to consist of thematic posters, link panels and hands-on interactive exhibits. The main objective was to give examples to demonstrate how every one of us can do something that can make a difference to our environment. The nine thematic posters each depicted an issue of concern in our everyday life, such as wastage of water, power consumption, greening, packaging and waste, garbage and its disposal. These posters were supplemented with link panels that carried detailed information as well as large photographs illustrating some key points. The posters and the link panels discussed briefly what impact various human activities would have on the environment and suggested simple, practical actions that could help mitigate some of the problems.

Each of the main themes also had an interactive element to it. These 'hands-on' exhibits attempted to directly involve the visitors in activities that demonstrated some points raised in the posters. For example, the visitors measured the quantity of water that dripped from a leaking tap in one minute, and observed an electric meter to find out how much electricity is consumed by various appliances which were plugged into a point directly attached to the meter. A small game was used to introduce the concept of sorting of garbage; a demonstration on putting waste material to use; and a counter where visitors could use available post cards to write to the relevant local authorities about environmental problems in their neighbourhood etc., are some examples of such hands-on exhibits.

It was felt that participating in such activities, even briefly, in an exhibition could be considered the first sign of commitment towards doing something about one's environment. The message for each individual was to Act Now, and that it is not only crucial but also possible to do so.

Going Places

The display at the Trade Fair in New Delhi, attracted large crowds as well as several school groups. The Act Now Exhibition moved to CEE, Ahmedabad from New Delhi. Here the visitors were organized school groups. We contacted a number of schools from in and around Ahmedabad. Students from classes V to VIII participated in this. The exhibition was then put up at the Visweswaraya Industrial and Technological Museum at Bangalore. The visitors, in this case, were mainly tourists and some organized school groups.

At all the places, there were volunteers who were present to interpret the posters as well as facilitate the hands-on activities. These facilitators were first oriented to the exhibition, its themes, and how to interpret these, as well as in conducting the activities.

One important feedback, both from comments in the visitor's books, and oral communication was that there were several enquiries regarding the possibility of borrowing the exhibition to be put up in other places.

This was encouraging. At the same time the exhibition as it had been fabricated was rather bulky and heavy and its transportation would also be expensive. Hence we began to explore a way of making the exhibition available in a more compact format.

Going to Scale

Looking to the demand of the exhibition, it was felt that it would be useful to print the posters and make them available widely. As we got ready to do this, we looked back to the feedback that we had got from all the above experiences and analysed our learnings.

Learnings

1. Audiences react best when the information, data, photos etc. in an exhibition are locale-specific, something they can relate to, something they see around them.

Therefore it is important to allow space within the exhibition for bringing in such details.

2. As the primary proposed audience were children and communities, it was important that the exhibition be available in the local language.
3. A facilitator who guides the group around the exhibition is crucial to sustaining interest and ensuring learning.
4. It is important to break up the monotony of posters and text with activities which help in consolidating and re-inforcing the messages on the posters. This way it is also possible to go from information to some level of attitude formation and action.
5. Children like to get involved in hands-on activities in which they do something or create something.
6. An exhibition may be a short experience, but it can be used as a way of triggering off a thinking process and a change in attitudes and action.

We decided to develop the Act Now exhibition in such a way as to accommodate these learnings.

The exhibition in the revised format consists of a set of posters, accompanied by a manual for the organizer. The manual has a number of suggestions on how to optimize the use of the posters to create a full-fledged exhibition. Every poster is discussed, starting with the theme, ideas on what could go on the supplementary panels, how to set up hands-on exhibits, points of discussion that could be used by volunteers, extra information, and suggestions on what visitors could take back with them.

Incorporating Learning

How did we incorporate the feedback in the package that was developed?

Locale-specificity: We emphasized that the



Photo: Sanskriti Menon

printed posters were only the skeleton of the exhibition and that the posters must be interspersed with charts, posters, photographs and models, preferably made by students, which reflected local information, data, concerns, etc. For each of the themes, we suggested the type of supplementary panels and link exhibits that could be prepared.

Language: We decided that we would print half the total number of poster sets without text. That is, the visual was printed and blanks were left where the text should be. We also printed a pamphlet with the text in English and with notes as to which part of the text should go where on the poster. This way, groups using the posters in different parts of the country could translate the text into the relevant language and fit it into the appropriate place. They could handwrite it, stick computer printouts, or use any other means. They could also introduce local data and information into this text.

Facilitators: The manual urged the organizers to ensure that there were facilitators to guide visitors around the exhibition. It also suggested how facilitators could initiate discussion, what activities they could carry out, what take-home ideas could be given, etc. The manual also had extra background information on the themes of each of the posters, so that facilitators could be better prepared to answer questions.



Interspersing activities:

Each of the posters dealt with a different theme, e.g. water conservation, conserving electricity, conserving cooking fuel, etc. In the manual, we suggested an activity that could be done

after each poster, on the same theme, which would link the information in the poster to the student's life and suggest actions they could take to improve the environment. The activities were such as would require minimal facilities/equipment etc., so that the organizers would be able to easily do them. How to sum up the demonstration/activity and draw out lessons was also suggested. For example, with the poster on water conservation, we suggested that the organizer set up and do the activity "Every Drop Counts" (see page 16).

Hands-on activities: Apart from demonstrations described above, certain activities that the children could get involved in were also suggested as part of the exhibition. For example, associated with the posters on waste management, we suggested that there could be a resource person who would teach children how to creatively use waste and make craft items, i.e. 'best from waste'. From our experience, this was a very popular stop.

Taking it further: Wherever possible, we tried to give some information, activity ideas etc., which the children could take home and do. For instance, at the poster discussing electricity, we had a chart giving the electrical consumption of various household items and

details on how to calculate a household's monthly consumption and bill. We suggested that this be given as a handout or that visitors be encouraged to copy this down. Suggestions on surveys and calculations they could do using this when they got home were also given to visitors. At the posters relating to garbage, visitors were given a hand-out with step-by-step instructions on how to make a compost pit for kitchen waste. At the poster related to the need for green spaces, it was suggested that visitors be given a sapling, accompanied by a note on how to plant and care for the plant.

Feedback

Through feedback from those who have used this package, it seems that it is working well. Thus, through this process, we feel that we have created an exhibition system which has the conceptual flow and basic information worked out, and which has a set of well produced posters as the framework. In-built in the system is an input from the side of those using the posters, in terms of adding to it and building upon it through link panels, data, photographs, models, etc. This ensures that there is an educational process involved in organizing the exhibition. As far as the visitors are concerned, the attempt has been to maximize their interest, interaction, and therefore learning.

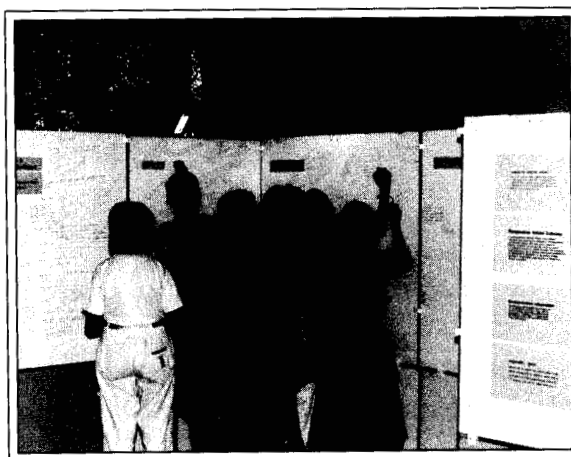
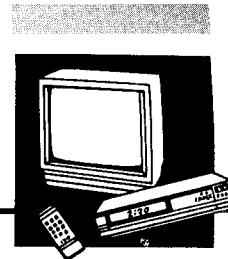


Photo: Sunil Jacob

Learning from the Box

Sunil Jacob



Television is still considered a luxury for many. But it has the potential to be an important medium for communicating about the environment. A pointer in this direction is the increase in viewership over the years. In India the number of channels have gone up from one to over a fifty. Another interesting point is that all the channels whether, Government run or private, have earmarked specific slots for telecasting educational programmes. With television and video facilities becoming more widely available and far-reaching, there is now a growing demand for good quality educational programmes.

Behavioural change using television as a medium might not be possible, but it can definitely help to develop an attitude, and motivate individuals to act positively towards the environment. Television thus becomes an important medium that can be effectively used for creating environmental awareness, to build up a cadre of aware citizens who would wisely use nature and its resources.

Television also has the potential to catch the attention of the viewer, especially children. This is because it has normally been associated with entertainment. The content or the message of the programme should be dealt in such a manner that it creeps in while the audience is being entertained.

Good quality video programmes find use not only in a broadcast mode. The programmes can be effectively used in non-broadcast situations such as, classrooms, camps, workshops, etc. A good video programme would be that which can help children understand about their surroundings and also inspire them to go and look for more information from other sources like teachers, books, library, etc.

This piece describes CEE's experiences of developing, testing and using a video programme for children.

Developing the Package

In 1989 CEE developed a video programme titled *Drakhi*, under an Indo-US project with the State University of New York, Syracuse. The one-hour programme was targeted at children in the age group of 10-14 years.

Before developing the programme a workshop was held to discuss what issues the programme should cover and the formats it should use. Through this workshop a list of possible issues and suitable locations vis-a-vis the topics, were developed. After this selection, the content for the programme was discussed and researched. This material was then given to a professional producer for making the programme.

Thus emerged *Drakhi*, a one-hour video programme in a story format that discusses concepts of drought; conservation of water; land, and vegetation; and management of exotic plant species.

After the video was made, a plan for use of the video was drawn up. Support material, to help teachers conduct the video viewing sessions was also prepared. This was in the form of an activity and discussion booklet which was designed to strengthen the educational objectives of the programme by reinforcing the concepts covered in the video.

A series of trials were held with teachers and students. With teachers the trials were aimed to find out how *Drakhi* could be used in a classroom situation, while with students we looked out for whether they enjoyed the programmes and how much they learnt from it.

Pre-viewing Session

The sessions began with the facilitators generating a discussion among students on what they understood by the term 'environment'. The initial responses mostly revolved around pollution and deforestation. The facilitators then asked leading questions to lead students to a broader understanding of the term. After the students had a fair understanding, the facilitators led the students on to the topic of the programme, which was on drought. This was done by asking the students about the importance of water and the consequences of water shortage.

A variety of approaches were used to get students involved. For example the students were asked to mime the condition of people, plants and animals in a situation of water scarcity. Students were also asked to mime various uses of water. In some trials it became difficult for every child to participate, for want of time. However when time was not a constraint, all the students were given a chance to mime and it became difficult to stop them from miming again and again!

After the discussion the students were briefed about the programme they were about to view, which was on drought, and to follow the story of what a young child like them does to combat drought.

Viewing Session

The team found that the viewing sessions usually began with students paying rapt attention. Uppermost was curiosity to see a programme on television which they perceived as an entertainment medium. The students in most cases enjoyed the programme wholeheartedly. The team tried several variations in showing the video. In some cases the second puppet sequence was skipped as it was found to be a little long. In one case, the team fast-forwarded a poem sequence and found the fast pace at which the visuals changed made a very interesting viewing

experience. Many a time, the students were found to identify themselves with the main character, Somu, and were seen laughing and weeping with him. In one case all the students were trying to spot *Drakhi* (a cow) in the cattle camp along with Somu, on the screen.

During trials with teachers, the team requested them to view the programme with their curriculum in mind. They were asked to correlate their curriculum and the contents of the film, and to jot down points while viewing the programme. Like the students had done, the teachers too identified with the main character Somu and displayed emotions to match.

During viewing the team observed the responses and reactions of students and teachers. They were observed for reactions like: nodding, strumming of fingers, laughing, crying, yawning, feet shuffling, distraction and talking. The programme was received well on the whole and the audience displayed a range of emotions in response to the different sequences. The students identified themselves with the main character, laughing and crying with him.

Post-viewing Session

After the viewing, the students were asked if they liked the programme and if they could understand it. They were asked to share what they liked or disliked about the programme.

This was followed by activities from the accompanying Activity Booklet which was designed to re-emphasize the concepts in the video. One activity involved students working in groups to work out different strategies that they would adopt in their village if they were to bring back *Drakhi*. The strategies were then presented to the rest of the class. The class then discussed the validity and feasibility of the success of the strategies.

The students were also asked to suggest methods by which they could help save water and protect soil, as individuals.

Learnings/Observations

Drakhi has been used widely in a non-broadcast mode. It has been used in training programmes, workshops, classrooms, etc. The audiences have been teachers, students and educators, and village communities.

Some common observations emerged during the sessions conducted. These may be useful for those developing similar programmes for children, and teachers using them in class.

It was found that the students generally enjoyed and understood the programme. We also observed that one of the points of distraction common in all the sessions conducted, was the titles rolling. It was also noticed that after about 20 minutes there was general distraction. But after a few minutes the students became attentive again, as they seemed to identify themselves with the main character. The students were often found to be distracted when there was no action and only dialogues in the programme.

Some of the students said that they could not follow certain parts of the programme. In some cases it was because of the dialect used, or when the dialogues were not clear, or when the language was too literary and abstract (as in the drought poem sequence). A few students felt that the programme should not end on a note of fantasy, but should end on something realistic.

It was observed that students were more attentive when the size of the group was not more than 45 - 55 students. When the group size was above 55 students, the group was generally restless and more easily distracted. This could be because of the limited audio and video reach of the small television screen. The interaction between the students and the facilitators were also greater and more meaningful when the group size was small.

In one case the audience was non-captive. The audience consisted of students from various schools attending a summer camp. This group was very relaxed while viewing, just as they

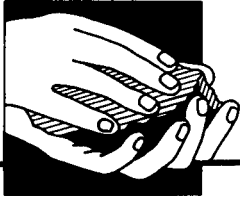


Photo: Sunil Jacob

would watch a favourite television programme at home. The students had their feet on the chairs, opened their lunch boxes and water bottles. In this case the team was apprehensive that the students would not get any message. It was surprising to find that these students comprehended better than those in a 'captive' situation such as in a class room.

In order to increase the educational value, the video programme must be preceded and succeeded with a discussion as far as possible. This helps the students to understand what they are to look out for and also to clarify their doubts after viewing the programme.

It was found that involving the children in a related activity after the end of the programme helps in recapitulating the messages. This hands-on experience helps the students to remember the messages. It is thus useful if the video programme is accompanied by a planned and structured series of activities. Alternatively a teacher using a video would need to first view it and develop such activities beforehand. Those developing video programmes could also develop accompanying material which could carry additional information on the topic, script of the programme, suggestions on how to use television as an effective medium for education, activities, discussion ideas, etc. Used in this manner, a video can become an effective medium for environmental education.



Let's Go Braille!

Sudha Premnath and R. Shailaja

Preparation of good reading material is one of the most important components of any educational programme. There has been considerable effort by many individuals and organizations to develop such material to serve the needs of different target groups. Unfortunately, very little attention has been given to the preparation of books specifically to cater to the needs of the visually handicapped, either children or adults. A survey of the market or a discussion with people interacting with the blind clearly reveals an acute paucity of educational, or for that matter, any reading material for these individuals.

Genesis of the Project

When an organization that runs a school for the visually handicapped approached us with a query about EE materials for the visually handicapped, we started looking at this area. We could suggest some material that had been developed in Braille by National Museum of Natural History, Delhi. This was existing material that had been directly translated into Braille. The request also set us thinking. We felt that this would be a good opportunity for us to come out with some of our own material in Braille.

This is not the first time that Centre for Environment Education (CEE) has had the opportunity of working with the visually handicapped. In 1988-89, CEE initiated a model programme for the blind which explored the use of touch and hearing in bird study. Components of the programme included recording of bird sounds, touch-and-feel models and a Braille booklet giving information on birds. Beside this, CEE also organized a workshop for teachers from the school run by the Blind Men's Association, Ahmedabad to

develop activities that they could use with their students.

With such experiences and experience of bringing out a number of publications on environment, as a first attempt, we decided to prepare environmental education material for the visually handicapped catering to an age group ranging from 8 to 12 years.

Development

We first reviewed our children's publications to see what we could use from there. We felt that some of the stories from two of CEE's earlier publications, namely, 'Forest Tales' and "Naturescope India", could be used. These were chosen because stories of animals, birds and jungles are inherently attractive to children. When these books were shown to a teacher who has a long experience in working with visually impaired children, she suggested that the stories needed small modifications to suit the target group.

Adapting for special needs

We chose five stories (four from "Forest Tales" and one from "Naturescope India") which were modified and compiled in the book "The Jungle Lore". Rhymes and riddles were included in the beginning of the book, to help children understand and visualize the different plant and animal characters that feature in these stories. One example is given below:

Neem

The handsome Neem, you must have heard about me,

My leaves, fruits and flowers are used as medicines you see!

Short and stout is my trunk, small bright-green are my leaves,

The tiny, white, fragrant flowers, a feast for the bees.

As for my small, round, yellow fruits, they are a crow's delicacy,

Try, chew my tender leaf, is it tasty?

Some facts on forests, their importance and different types have also been included at the end of the book.

Following CEE's basic premise that all its material should have an activity component, a separate book "In The Tracks Of The Wild" was developed, with ten activities. These were developed to complement the information gained from the story book. Most of these activities involved the sense of sound, touch and smell. Many of them were designed so that the children could perform them on their own, formulate their independent concepts and conclusions and thus discover their immediate environment.

Executing the Project

With the completion of the written texts of these two books began the most important phase of this whole exercise — translating the entire text into Braille. After having reviewed the fairly limited options in this area, we chanced upon an organization called "Abilities", a resource centre for disabled persons. The organization is actively involved in developing a variety of material for the disabled. We discovered that they are one among a few organizations in the country who have a computerised Braille printing facility. This facilitated the printing of multiple copies of the books that were developed by us. In addition, "Abilities" helped in editing the books to suit our final target audience.

Following the suggestion from "Abilities" the two books were eventually developed into "twin vision" books. In these books the text and their corresponding Braille pages are

placed facing each other. Such a design has many advantages. The books can be used as 'read along' books, where a sighted person (parent or friend) can read the book along with a blind child or vice-versa. In addition, for two of the illustrations in the story book, the outlines were defined with the use of materials such as wool and thread, so that the blind child can understand the picture by moving his/her hand over it.

To make the story book more interesting, an audio cassette, with the narration of the stories was produced. The narration was done by five students from The Valley School, Bangalore. The disabled children can read the stories from "Jungle Lore" accompanied by the narration in the tape. The two together would make the experience more enriching for the youngsters.

Jungle Tracks

What finally emerged was a package called "Jungle Tracks", which includes the story book, the activity book, and the audio-cassette. The package is now ready and can be used by sighted children as well as visually impaired children as the books contain both the printed text and its corresponding Braille page. Another interesting feature is that the two books and tape can be used either as a set or as independent units.

As an initial step, twenty five sets have been produced. The numbers are limited by the fact that each copy has to be "printed" and bound individually. Fifteen copies have been sent free of cost to deserving schools for the blind (as identified by "Abilities") across the country. We hope that other schools too will be able to use the package.

The process of developing the package has been very exciting and a new learning experience for CEE. It has opened new doors to expanding our horizon and exploring another area of communication.

FROM AWARENESS TO ACTION



The ultimate goal of environmental education is action — action to improve the environment, prevent its degradation and sustain its well-being. For children, action can become a powerful way of learning about the environment because they get a first hand exposure to real-life situations, they begin to feel responsible for their immediate environment, and because they realize that their actions can make a difference.

Through such the process of carrying out projects, children learn how to put theory and information learnt in school to practical use. They can get involved in issues that require research, issue analysis, in-depth discussion, planning and follow-up. They could learn to set up environmental quality monitoring activities, conduct community education initiatives, learn to plan and execute campaigns, or lobby on specific issues at the local level.

Through action projects whether at home, school or in the community, children will realize the impact of their actions on the environment, and the linkages with the larger environment.

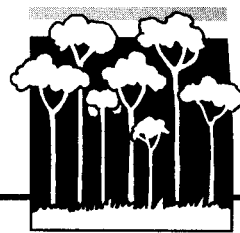
The sense of active participation and achievement that result from undertaking these projects will excite and motivate students, and lay the foundation for a lasting commitment to the environment.

This section describes some projects which have tried to achieve this. Experiences of environmental action projects done with the formal education system, and of working with volunteer youth are described, as well as some of the problems and solutions. The empowerment of young people through providing them an opportunity to interact with the real world come through in the projects to monitor different parameters of environmental quality.

“To improve sustainable development education nations should seek to involve school children in local and regional studies on environmental health, including safe drinking water, sanitation, food, and the environmental and economic impacts of resource use”
— Agenda 21

Empowering Youth for a Better Future

Madhavi Joshi



The past few decades have witnessed city infrastructure crumbling in the wake of pressures exerted by population explosion coupled with increased levels of consumption and consumerism. It is recognized today that participation of citizens is necessary for rebuilding the systems that any modern city subsists on. Youth are an important asset to society, whose energies, if harnessed properly, can help in lifting us from the rut that we find ourselves in.

Clean Green Projects of CEE were initiated as a summer project involving twenty youngsters interested in spending their vacations doing something 'constructive'. During the last three years these have been built upon and consolidated into a process that 'works.'

The Clean Green projects are based on the following premises:

- that youth have the energy, will, and can do something about the environment they live in, if given the opportunity and direction.
- that youth are our future generation and therefore attitudes to safeguard the environment built now will remain with them for a lifetime. Therefore to invest in youth is to ensure our future.

Interested participants are contacted by announcing the project in newspapers, strategic placing of posters at spots likely to attract youngsters such as libraries, coaching classes, eating places, clubs etc. Clean Green participants of previous years have been recommending youngsters for the projects. In fact, they screen these people before recommending them to join, to ensure that only serious participants enter the programme!

The Approach

The 'information to action' approach of the project takes participants through a process of assimilating knowledge; understanding larger issues related to the urban environment by systematic study methods; and the process of developing communication strategies to deal with these issues. The project sees education as a two-way communication which enables participation and learning. It is a part of a life-long socialization process which includes communication of knowledge, skills, and shaping of attitudes.

The strength of the Clean Green project lies in the emphasis on participatory methods of 'learning by doing'. The emphasis is also on the responsibility of youth as citizens, to become aware and to contribute towards improving the immediate environment. By doing so they are contributing their bit towards the larger goal of improving the city's environment. Here, the term 'action' goes beyond one-time activities such as cleaning-up operations or drives which have mass appeal but do not initiate any discernible change in the way things work. Action here signifies the beginning of a process of change towards improving the immediate urban environment. Change in attitude and behavior also means learning how not to act—actions which one needs to unlearn.

The Process

From day one, participants realise the difference between the routine class room 'teaching' they are used to and an interactive participatory approach to 'learning' that the project employs.

Four steps are inherent in the process. These are dealt with as specific modules.

1. **Orientation:** About five days are spent in orienting the participants to help to focus on the issue, as without an understanding of the varied dimensions of an issue, practical solutions to the related problems cannot be found. Background information about the subject matter, its relevance today, associated problem areas and solutions available at various levels such as the government bodies and citizens, is provided to the participants. The sessions are participatory and interactive, constantly linking the discussions with reality through visualising these in real life, through field visits, use of audio visuals and through activities and games. Interaction with subject experts helps participants to understand the issue in the context of the complex maze of activities and actors within an urban environment.
2. **Research:** The participants then go to the research stage where they study the issue scientifically and systematically. The Rapid Urban Appraisal (RUA) technique which employs qualitative and quantitative techniques of data collection is introduced to the participants. Triangulation, which involves gathering data from various sources: primary, (such as the target group) and secondary, (such as reports, office records etc.) is an important component of RUA. It also means gathering data from different strata in the selected area of study. Observation and visual documentation through photographs are other important tools used in RUA. Mapping of the selected area for its location of physical resources helps identify problem areas and plan solutions. The research exercise provides the participants an opportunity to develop the skills to observe, interact with strangers, assimilate data and present it in a systematic format. Team work and presentation to a peer group are important components of the project.

3. **Communication:** In this step, participants go through sessions which help understand communication as a two way process and also help develop communication skills. Based on the findings of the RUA, a communication methodology is developed. This module takes the participatory approach further by strengthening group processes and developing communication skills through various activities. Understanding the role of an 'educator' is an important learning for the participants. They realise that with planned and deliberate use of communication, people can be made aware of their predicament and mobilized into action. Communication here is used to initiate and facilitate communication among the community which makes the project participatory. According to Manfred Oepen (1988), the emphasis needs to be on "the communication process instead of the media project and the development action instead of the media product" (*The Empowerment of Culture: Development Communication and Popular Media*, Ad Boeren and Kees Epskamp, eds. 1992).

Easily the most enjoyable of all the modules, it is also the most taxing. Participants are expected to develop a communication strategy, media communication aids and also work out arrangements for using them. Their information and research findings provide the framework to come up with a workable strategy for action.

4. **Action:** In this phase, participants implement the planned strategy and follow up on solutions suggested. Here participants learn organisational skills, develop an understanding of the various actors involved in dealing with an issue and how the interlinkages work in reality. They are able to put to test their knowledge and skills in the field. They face the world and gain in confidence from their successes and learn from failures.

Clean Green Projects - '94, '95, '96

Garbage management has been a recurring theme during the projects. The problem of managing garbage can be solved only through partnership between citizens and the local government. Today, in urban areas, it is generally local government bodies which look after the management of garbage. They face severe infrastructural and financial constraints besides having an inefficient work force. Citizens also are apathetic towards disposal of



Photo: Sunil Jacob

garbage beyond their living premises as they fail to see uncollected waste as a problem, placing the onus of responsibility on the government. Lack of cooperation from the people, who often put their waste out at wrong times and in unassigned places negates even the most meticulously planned system. The repercussions of resultant unsanitary conditions are usually faced by the sweepers and the ragpickers, who are low on the socio-economic ladder, and are directly exposed to waste, owing to their occupation. Therefore, for any garbage management system to function efficiently, active support of people is necessary. This can be brought about by creating awareness among them about the way in which they can contribute to improve and protect their living environments. Awareness, knowledge and skills would help people adopt socially and environmentally responsible lifestyles that do not endanger other people and future generations.

Clean Green '94 spanning over five weeks was designed to provide the participants with information about garbage, its disposal and the problem areas, and develop an action plan to deal with the problem areas. Waste, its types, how generation of waste is related to degradation of environment and natural resources, waste management and its various dimensions, segregation of waste into organic, non organic, and recyclables, and the informal recycling sector were the concepts dealt with during the first week's orientation. Some interesting features of the orientation were field visits to an incinerator and Excel industries' compost plant, and getting to know about garbage management in our country and outside through video films, and a lecture-slide show presentation by the Deputy Municipal Commissioner looking after Ahmedabad's garbage management. Data was gathered from three residential areas of different types using RUA about garbage disposal and collection at household and neighbourhood levels. Participants presented the findings using charts and neighbourhood maps. These became the basis for the communications strategy which was different for Indian Institute of Management campus, Manekbaug society and Saraswatinagar society. The strategy was a garbage *mela* in IIM, street corner puppet shows in Manekbaug society and small group meetings in Saraswatinagar society. Accordingly, media were developed. The garbage *mela* included garbage games, informative charts and posters, and the puppet show developed by the Manekbaug group. Eventually the Manekbaug group also organized a garbage *mela* as they could not organise a series of street corner puppet shows owing to lack of preparation time in the field and inability to get people together at a place. The Saraswatinagar society team developed flip charts which they used during the society committee meeting to present their suggestions for improving garbage management in the society. The participants also presented to the AMC their findings, suggestions and the communication strategy. They were invited to

present the same before a visiting team of the World Bank. The students' suggestions were immediately followed up by the AMC, which boosted the morale of the students.

Clean Green '95 ensured that the spadework for selection of residential areas to implement action was rigorous to ensure follow up. Linkages were established with city based organizations such as SEWA, besides AMC, who were involved in collection of dry and wet garbage to ensure sustainable solutions. Follow up after project completion ensured regular segregation and collection of waste from the four societies. We also responded to a request by a society in this area to set up a garbage collection system.

Clean Green '96, again, while adhering to the 'process' orientation, made changes in its area of operation. Six participants of previous Clean Green projects were volunteers assisting in organising and documenting the day-to-day happenings. The area selected for garbage management study was commercial complexes in Memnagar, a thriving business place bustling with activity.

The strategy worked out by the students after the RUA consisted of :

1. organising meetings between shopkeepers and the *nagarpalika*.
2. convincing the shopkeepers to place bins while the *nagarpalika* provides the regular collection support.
3. a general awareness campaign to draw the public's attention to the vital issues involved and also to present them with some tips to manage their garbage more efficiently.
4. trying to link with the sweepers and various other individuals involved in the garbage management system of the area.

Besides garbage, Clean Green '96 addressed the problem of vehicular air pollution. Ahmedabad ranks among the highest polluted

cities in the country. Pollution resulting from auto-exhausts of vehicles is a major cause for concern. A failing public transport system, unable to cater to the burgeoning populace, has resulted in proliferation in personal transport. Besides buses, thousands of two-wheelers and cars spew deadly pollutants into the air every day. Waiting at the traffic signal during peak traffic hours is a nightmare.

Studies by National Institute of Occupational Health, Ahmedabad (NIOH) indicate greater susceptibility to health effects such as eye irritation, headache, giddiness, respiratory system related diseases such as asthma among people exposed to these conditions. The increasing number of rickshaws which add kerosene to their petrol led to a large scale punitive action by the traffic authorities who seized all such vehicles. It remains to be seen how effectively these measures can be sustained by the authorities, once these vehicles are back on the road.

Participants to Clean Green 96 were oriented by scientists from National Institute of Occupational Health (NIOH), to this issue. They also observed demonstrations of auto exhaust emission testing equipment for petrol and diesel driven vehicles. Participants gathered information from vehicle and garage owners about their awareness about auto exhaust emissions, their impact on health, and control measures required. The strategy that developed focussed on creating awareness and providing information like basic tips to reduce air pollution to vehicle-owning public through a campaign at a busy petrol pump on Ashram Road. GPCB organised the auto exhaust emission tests while the Clean Green participants gave pamphlets and stickers with messages on simple measures to reduce air pollution to about 300 vehicle owners. As a follow up to the emission checking drive, a workshop on 'Air Pollution and Control' was organised to discuss the 'Pollution Under Control' certificate to be made mandatory for vehicle owners as in Delhi and Mumbai.

The workshop also deliberated on the need for public awareness and involving student groups like the Clean Green participants to monitor the systems once they were in place.

Photo: Sunil Jacob



The Clean Green projects do not really end when the project duration is over. They open up new avenues for 'learning by doing' for the participants and the team. The strategies developed during the project are long term and build in mechanisms through which follow up becomes possible after the completion of the project. Some of the participants from the Clean Green projects have recently formed an eco-club called the Club of Youth Working for Environment (CYWEN) which carries on from where the project left.

Problems Encountered

1. Attitude of community towards the participants: People, many a times, did not respond to the questions and were not interested in suggestions of the participants. Some of them were cynical about the outcome of such activities which according to them were the responsibility of the local administration.
2. Limitations on time of participants: Many of the participants joining Clean Green projects belong to Class X or XII and therefore get busy seeking admissions or studying for future examinations once the

vacations are over. The project also technically gets over after four weeks. So the momentum is lost once the students go away. Though the scope for follow up has subsequently been built into the programme, this was not so in the first year.

3. Lack of sustained commitment: Some students tend to leave the project in between, for reasons such as difficulty in long-term commitment, social functions and going out of town. This creates an imbalance in group processes. Over the three years, the problem was taken care of at the time of application itself by carefully screening applicants and allowing only those to participate who are willing to complete the project. Each applicant is given a brief idea about the 'process' orientation of the project to emphasize the importance of continuity of members in the project.
4. Difficulty in follow up as linkages need constant sustenance: Implementation is to a large extent dependent on how well the interconnections between the different actors work. These need constant contact and follow up which takes a lot of time.
5. Students are not as intensively involved in activities later because of other preoccupations. Participants, though interested in following up on their project work, are unable to spare time once they get busy with college and other activities.
6. The project envisages change in attitudes and behavior of people. This needs sustained educational input. People need a lot of convincing to adopt anything that is different from what they are used to. Participants sometimes feel frustrated when they encounter disappointments in the field.
7. Lack of coordination and communication between the various agencies responsible for implementing solutions. A system for collection of segregated garbage will work

only if all the actors play their roles well. The people must segregate their garbage, the ragpickers must pick it up at the appointed time, the corporation must provide for disposing and collecting wet garbage regularly. Any problem in one of these affects the entire chain. And none of these factors is in the control of the participants!

8. Within the government agencies themselves, the decisions taken at the top are not necessarily in consultation with those responsible for their implementation. Therefore, the best solutions may not work in the field because of some practical difficulties which should have been sorted out beforehand.

Learnings

1. Planning ahead can help in making well-considered and strategic choices at the right time. For example survey findings help decide the communication strategy and the strategy determines the field level action. The plan is flexible enough to accommodate the decisions taken "on-line" such as developing a particular media or organizing an event in the community. This is possible because of prior brainstorming by the participants on anticipated outcomes of the strategies that may be developed, and preparing for these.
2. The project plan has to be flexible and must evolve based on previous experiences and learnings.
3. The target groups must be involved in all stages of this process.
4. The "homework" in terms of research into the fundamental dimensions of the issue being taken up needs to be thorough and must form the basis of the project plan.
5. Research should include social and behavioural dimensions of the issue as these are important determinants for setting realistic objectives.
6. It may be best to start small-scale initiatives which may be replicated in future.
7. It must be recognised that the participants in the projects are not empty bottles. Their experiences and observations are important.
8. Project planners need to look at factors that sustain interest of participants such as enjoyment, learning, and growth.
9. Monitoring activities and their impact during and after the project are important if the project is to leave any meaningful impact.
10. Recording and documenting processes is helpful in sharing the learnings with others.
11. Participatory approaches to learning help sustain interest and enhance learning and involvement.
12. Establishing strong linkages with implementing agencies is necessary for long term sustainability of the project.
13. A communications strategy must take into account the needs of the target group. The 'entertainment with a message' kind of communication seems to work in this setting.
14. Participant feedback to improve upon the loose ends must be encouraged.
15. Also projects such as the Clean Green are about developing attitudes to safeguard the environment among youth. Therefore, avenues to nurture and constantly feed the enthusiasm of the youth participants of the project must be created. CYWEN is an outcome of such conscious attempts since Clean Green started.

Campaigns: The Kodagu Experience

Shyamala Krishna, Archana Dange, Jyotsna Belliappa, M. Sowmya



Introduction

Any voluntary organization that has the general public as its target audience for Environmental Education, needs to plan out an appropriate media strategy to elicit maximum response. The ideal media strategy would be one that reaches each person of the community directly. Besides, inter-personal communication is considered among the most effective methods of communication. But if any environmental awareness is to be created and any action is to follow, a door-to-door or person-to-person approach may be impractical, especially taking into consideration the kind of woman/manpower most voluntary organizations have at their disposal. To overcome this constraint and achieve maximum results, public campaigns can be used, which also attract sufficient media attention and hence serve to draw greater number of persons into a movement.

The Clean-Up-Kodagu (CUK) campaign was a public campaign which had a very good media mix. There were lectures, demonstrations, songs, drama, distribution of educational and promotional material, and action programmes. Hence there were plenty of opportunities for person-to-person contact especially for students with their own communities, and with others in the public like estate owners, shopkeepers, tourists, pilgrims and government officials.

Project

The CUK campaign was spearheaded by a group of concerned citizens of Kodagu. Led by the Hon. Wildlife Warden, Govt. of Karnataka, Shri P. M. Aiyanna, it drew inspiration from a similar campaign called Clean-Up-the World started in 1993 in

collaboration with UNEP. CEE South designed and structured the entire campaign along with Mr. Aiyanna, besides designing and printing posters, pamphlets and campaign material.

Kodagu is the second smallest district in Karnataka (4,102 sq km area, population is 4,85,000 persons as per 1991 census) situated on the eastern and western slopes of the Western Ghats. It is a picturesque high land, lush with thick forest and plantations growing coffee, cardamom and oranges. The valleys are used to grow paddy.

This tiny district which had been considered rural until a few years ago, has in the past decade been speedily moving towards urbanization. One of the major indications of this is the ever-increasing garbage that is seen strewn on the roadside.

Aim

CUK aimed to rid Kodagu of almost 500 tonnes of non-biodegradable waste with active participation from the people of Kodagu.

Objectives

Through CUK, it was desired

1. to create awareness about various environmental issues of Kodagu such as deforestation, pollution and garbage.
2. to create awareness about the waste that occurs when non bio-degradables are thrown on the road side instead of being recycled.
3. to motivate people and children into collecting non bio-degradable wastes.
4. to create a media focus for CUK activities by raising the awareness of Government,

industries and communities about local environmental issues particularly about recycling and waste management.

Target

To begin with, CUK targeted the campaign towards 2 lakh school children of 592 schools in the district. Through the children, the campaign hoped to reach the general public and thus create awareness about the amount of garbage that lands on the roads and hillsides in Kodagu.

CEE South supported the campaign through its Solid Waste Management Project sponsored by NORAD, (Norwegian Agency for Development Cooperation). A committee headed by the Deputy Commissioner, supported by the Superintendent of Police, Conservator of Forests, Deputy Director of Public Instruction and local citizens of Kodagu district was formed for smooth operation of the campaign.

The Campaign

The Clean-up-Kodagu campaign was launched in the entire district of Kodagu in 1993 and was in its fourth operational year in 1996.

Clean Up Kodagu- '93

A team consisting of Mr. P. M. Aiyanna (Hon. Wildlife Warden of Kodagu), 7-8 members of *Shrusti Kodagu Ranga* (SKR, a street theater group from Kodagu), a CEE member and one or two members from the CUK committee decided to travel around Kodagu, especially to schools where they would perform and demonstrate to the school children about various aspects of Kodagu's environment. From August 26th to September 15th, 1993 the team visited a minimum of five schools a day to spread the spirit of the campaign and create awareness about cleanliness, recycling and less wastage. The programme in each school involved a demonstration as to the various items of garbage that could be

collected. Three little skits on local environmental issues were performed by the theater group SKR. Banners, posters, stickers, plastic bags and bins were handed over to the Principal of each school. Each child was asked to bring from their home, all discarded and broken items which were then collected in their school and stored as such, or in a segregated manner in one of the rooms.

The second phase of the campaign began on September 15th and intensified on the following two days when 25 volunteers from each school went out to collect garbage. These volunteers were provided with badges, sunshades, gloves and large garbage bags to aid them in their endeavour. This activity brought the children into contact with the general community like shopkeepers, tailors, office goers and other business personnel who were touched by the sincerity with which the children collected garbage and they were motivated to join the Campaign.



Photo courtesy: CEE South

This part of the Campaign also involved cleaning the birth place of River Cauvery - Talacauvery - as well as other tourist and pilgrim spots, thereby making the visitors aware of the problems of littering and the need to keep the area free from such garbage. As we are all aware, important pilgrim and tourist centres are always victims of excessive littering and need special care, attention and co-operation from the tourists.



The garbage so collected by each school was sold to recycling agents who had been identified on the basis of their bidding for collecting garbage from these institutions.

50 per cent of the money generated from collecting and selling the non-biodegradable waste was kept by the schools as corpus to form Eco-clubs wherein the money was utilized for camps, excursions and other environmental education activities. The remaining money was offered as cash prizes to the children participating in the campaign or as scholarships, books etc., to deserving students.

Annual Events

The response to Clean Up Kodagu- '93 was so enthusiastic that it was decided to make it an annual event. Clean Up Kodagu- '94 and Clean up Kodagu- '95 were run on the same lines with some minor changes in the implementation. However in the years 1994 and 1995, CUK was limited to 32 schools of the district which had formed eco-clubs in 1993.

The number of schools followed up was reduced because of the problems of logistics and women/manpower faced during CUK 1993. It was felt that the message could be communicated better by concentrating on fewer schools who would then act as models or resource schools for other schools and educational institutions in the Kodagu district to emulate.

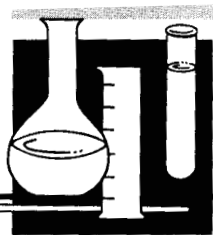
Another change incorporated in the campaign was that the collection and recycling of waste was decentralized, i.e. each block or *taluk's* agents collected the waste from educational institutions in that block or *taluk* only.

In 1994 only three classes i.e. 7th, 8th and 9th were involved in the Campaign. But in 1995 children of junior and high school were involved. Thus the number of children involved in the campaign was higher in 1995.

Learnings

From the experience of the CUK conducted over the last three years, it has been observed that for a campaign to be effective, a right media mix must be applied. Street theatre, folk songs, personal communications and video shows have been the main media of instruction in the campaign. The campaign through its multimedia approach has touched the lives of all the people of Kodagu and has succeeded in mobilizing the children and their teachers. It has managed to achieve a personal touch in education, as a small team of convinced persons reached out in various ways to the general public to create awareness, change attitudes and motivate them into action for protection and conservation of their environment.





Water Quality Monitoring

Vivek S. Khadpekar

Introduction

Fieldwork is an exciting and effective way of learning about the environment. It makes study and understanding relevant to the learner's own surroundings. Learning becomes more intimate, creative and enduring than it can be with traditional means such as textbooks, classroom lectures, or labwork aimed at endorsing theory. Those methods provide the conceptual framework. Fieldwork adds sustaining substance to the framework.

In conventional school labwork, done under control conditions, results are predictable (indeed they are often prescribed; any deviations, rather than being analysed, may be penalised; this leads to the familiar situation of lab journals being blindly copied by successive batches of students from their seniors). In fieldwork a complex of variables enters the picture, control conditions become difficult to impose, and there cannot be any predictable or prescribed results. Findings, including errors, represent reality. They demand explanations which may not be readily available from textbooks. The search for explanations compels students and teachers to make an effort to understand reality. From merely verifying second-hand data they move towards doing their own research. This reinforces learning.

Several interesting EE possibilities exist in environmental quality monitoring (EQM), among them water quality monitoring (WQM). Water is a basic support of life on earth, and of the broader entity which we call our environment, on whose quality as a whole, water quality has direct, demonstrable bearing. It can be studied within the average school student's constraints of theoretical knowledge and access to equipment. The present paper describes a school-based WQM programme.

Project Background

In 1987 the Ganga Project Directorate (GPD) asked CEE to develop a programme which would involve science students of secondary and higher secondary schools along the Ganga in monitoring river water quality. The aim was to get a group from outside the government system to do work whose results would enhance public awareness about the Ganga Action Plan (GAP). GPD felt that such work could serve as an independent endorsement of actions taken under GAP, leading to popular support for it. The programme was to be carried out in field (riverside) conditions by students working under the supervision of teachers, with support by the school education administrations of the states through which the Ganga flows, namely Uttar Pradesh, Bihar and West Bengal.

CEE saw this as an opportunity to promote its philosophy of 'learning by doing', bringing students to apply to a real-life situation at their very doorsteps the science learnt in the classroom, and to interpret the environmental implications of their findings. We also felt that a network for the exchange of information thus collected from different locations along the river would serve to strengthen the programme by building up a sense of shared concern and partnership among student groups working in mutual isolation over a large geographical area.

Planning the Programme

The first step was to identify tests of water quality feasible within the limitations of the students' knowledge of science and the support infrastructure available with the schools. GPD had recommended that the programme be taken up initially in about 100 schools and that

in any given school it should exclusively involve students from either Std. IX or Std. XI. There was to be no mix of students from different levels, and in each school the entire class named had to participate. CEE decided that the schools, identified in consultation with the respective state education authorities, be preferably non-elite and distributed over rural as well as urban areas. Accordingly 50 schools in Uttar Pradesh, 25 in Bihar and 25 in West Bengal were selected for the Ganga Pollution Awareness Programme (GPAP).

Considering the level of science knowledge of the proposed participants, and the hazards inherent in fieldwork on a major river, CEE shortlisted nine physical and chemical parameters on which the students could work. These were

1. temperature
2. colour
3. odour
4. turbidity
5. nonfilterable solids
6. hardness
7. presence of ammonia
8. pH
9. dissolved oxygen (DO)

Parameters such as Biological Oxygen Demand and Chemical Oxygen Demand, though important, were not taken as the rigorous scientific methodology demanded by the tests for them were felt to be beyond the capabilities of students at this level. Study of riverine life-forms was excluded because of the risks inherent in a group of young people doing such an activity on a major river with a massive flow.

It was initially thought that tests of volatile parameters such as temperature and odour, as well as fixation of the sample for the dissolved oxygen test could be done on site, and the remaining tests, including the measurement of DO, could be done in the school laboratory. However, it was found that many of the schools

involved did not have a lab. Consequently, a field kit containing reagents and equipment necessary for performing the tests was developed. In order to avoid costly meters, and to underscore the connection of the tests done to the science learnt at school, simple time-tested methods were adopted with some modifications to permit their performance in the field without risk of mishap.

Several interesting innovations went into the kit. For example, the standard laboratory thermometer is graduated from 0° to 100° C (the actual range needed was just 0° to 40°); its length, nearly 40 cm, makes it fragile; its mercury column is difficult to read outdoors against a bright background. An alternative thermometer available off the shelf was introduced, graduated from 0° to 50° C, less than 20 cm long, and using red coloured alcohol instead of mercury.

Similarly, the volumes of reagents used for the tests (1-10 ml) made unnecessary the use of fragile and unwieldy burettes and pipettes. Plastic syringes of 2 and 10 ml, each labelled for use with a unique reagent to prevent contamination, were included. To the greatest extent possible, glassware was substituted with plastic. These modifications made the kit compact and sturdy, and reduced the possibilities of breakage and injuries, making it suitable for use in field conditions.

A teacher's manual accompanying the kit explained how to perform each test, its scientific basis, how to record the findings and interpret their environmental significance, and how to prepare replacement stocks of reagents. It also laid down guidelines for the discipline to be observed and the precautions to be taken while performing the tests. Sets consisting of three kits, replacement stocks of reagents for a year's work, and the manual were given to the schools by GPD. The decision to give three sets was taken to ensure that the kits were actually used, and that every student in a batch got a hands-on opportunity to do at least one test.

The Next Steps

The second step was to orient education administrators and some selected teachers to the idea of such work. At workshops held for this purpose, they were put through hands-on experience of using the kits outdoors. This proved very useful. The teachers had the necessary scientific know-how, but found it a novelty to perform the experiments outside a lab. They soon saw that the kit was in fact a portable lab. Having themselves experienced its use they were enthused to put their students through a similar experience. The more adept among them, two from each state, were designated as programme resource persons for their respective states.

The third step was to introduce the programme to the children themselves. A series of pilot workshops were held in a number of schools, at which CEE scientists and the state resource persons put through their paces the children, as well as the teachers, who would conduct the programme.

The programme was launched on a pilot basis in 80-odd schools in the three states, with sampling and testing activities being performed at intervals of approximately two months.



Photo courtesy: CEE

Results from the first two rounds of sampling were received by CEE and were found to be encouraging in some cases, disappointing in others. Student response was uniformly

enthusiastic. At the level of teachers or school managements the response was mixed. Some details of the experiences are discussed below.

In some schools teachers were clearly enthusiastic and used their imagination to go well beyond the least requirements of the programme, leading and encouraging students to make it a creative learning experience. A girls' secondary school with no science teaching programme got included by clerical error. The quality of its work ranked amongst the best. In Varanasi, a slum school with a mathematics teacher handling science subjects, not only did competent monitoring but also mapped the stretch of river monitored, recording pollution sources. A higher secondary teacher in Hardwar voluntarily expanded the scope of activities to be done, drew up a plan to set up a lab and study centre outside the school system where anyone interested could do such work, and went around trying to mobilise local funding support to implement his plan.

On the other hand, there were some cases where it seemed that the programme had been mechanically and unimaginatively gone through. In some of the better-off schools in large cities, teachers felt that a co-curricular programme to be done outside regular school hours was an intrusion into their time. In a few instances, while teachers were enthusiastic, school managements were not. They were participating only because they were ordered by the state education authorities to do so.

CEE compiled the results received and circulated them to all the participating schools, laying the foundations for what, it was hoped, would evolve as a network for exchange of programme information among the schools. They were also shown by GPD to the Prime Minister, whose appreciative comments on the work were communicated to all the participating students and teachers.

Problems and Solutions

Problems were faced at two levels, academic

and administrative. Academically, the culture of quantitative exactness, which is a characteristic of science education in our schools, led to some work of doubtful scientific value. For example the test for turbidity, performed using the Secchi disk, required an average of two readings to be taken. Done mechanically, this method yielded results to the second decimal place of a centimetre. It was explained to the teachers that the Secchi disk was a crude device, and that anything more precise than the nearest round figure in centimetres was not significant. They had difficulties in accepting that a 'scientific' method could be 'crude', and in coming to terms with the concept of statistical significance.

Interpretation of results and of the correlation between the parameters measured presented other kinds of problems. Although this was dealt with in the manual, few teachers really went into it. Thus while parameters like, say, temperature, dissolved oxygen and turbidity were individually measured, hardly any attempts were made to explain the possible cause-and-effect relationship between them. This suggests that the work was done ritualistically rather than in a spirit of scientific inquiry.

At the administrative level, owing to circumstantial limitations (start of activities late in the academic year, interruptions due to rains and floods, examination and vacation schedules etc.) most schools could do only two or three rounds of sampling during the academic year instead of the prescribed six, and the gap between rounds varied considerably from school to school. At the end of the year the participating classes had graduated to the next level and were therefore, by definition, outside the ambit of the programme. Their place was taken by new batches of students with no previous experience of the programme. In few schools was an initiative taken to introduce these new batches to the programme.

The academic problems could be addressed by directly dealing with the teachers, and this was

done with moderate success. The administrative problems were more systemic in nature, and could not be resolved within the short duration of the pilot phase of the programme.

Learnings

The enthusiasm with which the programme was received by students and by genuinely interested teachers was heartening, and the quality of work done by these groups suggests that it has tremendous value in promoting environmental awareness through scientific inquiry. Particularly noteworthy in this respect are the examples, cited earlier, of the work done by the girls' school which had no science curriculum and the slum school in Varanasi, which did not have a trained science teacher. At the same time, the administrative problems faced clearly indicate that the scope of doing such work as a co-curricular activity within the formal academic system, specially in high schools, is limited. The system at this level is oriented almost entirely to examinations and results. It has no room for educational activities which do not directly match this orientation.

The Secretary (Secondary Education), Uttar Pradesh, effectively highlighted this dilemma when he said that, while he appreciated the educational value of such a programme, he could ensure its continuation within the system only if it was tailored to be implemented in all schools in the state and to be reflected in examination results. To do the latter would effectively open up the programme to the same problems as the regular teaching.

There is potential for doing such activities in alternative forums such as science clubs and eco-clubs. These exist in a number of schools. The scheme of Socially Useful Productive Work (SUPW) also holds out possibilities if schools are ready to accept this as an activity that can be done under the scheme. If this can be achieved, there is even a modest budget available for incidental expenses, which were not provided for under GPAP, and which in

some schools was one of the stumbling blocks of the programme.

CEE's own informal evaluation of the programme came to a conclusion that these alternatives, or similar others, would have to be adopted if the programme was to be sustained.

Firstly, there should be no compulsion to participate just because one is studying in a particular class. Only those who are actually interested should be involved.

Further, we also felt that the restriction of participation to students of a particular class was a serious obstacle. It is not necessarily true that the level of science education prerequisite for such work obtains only at levels Std. IX and above. Curricula and teachers are not the only sources from which children learn. They also learn from each other. Thus if a group working on WQM were to comprise a mix of students from, say, Stds. VII through XI, the juniors would not only already be equipped for the simpler activities (such as recording temperature and odour), they could also learn from the seniors some of the more advanced activities for which their curricular inputs have not formally equipped them. More importantly, such a mix of students would ensure that even if some of them graduate out of the group, there would still remain others in it who are competent to continue the work and to orient newcomers. This would ensure continuity of the programme and, over time, help to add more dimensions and activities to it.

The idea of the Hardwar school teacher, cited earlier, of starting a separate laboratory and study centre which would bring together different groups of people, from beyond the confines of the participating school, who are interested in doing WQM activities, deserves to be seriously considered. It would serve to effectively integrate all the strategic options which emerge from our informal evaluation and which can be said to be the significant learnings from the experience.

Other learnings which emerged are also

important, but they tend to radically alter the basic purpose and objectives of the programme, which is the promotion of WQM as an EE activity. They go into the use of such activities for

direct intervention in environmental issues relevant to social stresses, taking WQM from the realm of education into environmental activism.

These learnings and the possibilities they generate are discussed separately below, as extensions and variations of the programme.



Photo courtesy: CEE

Extension/Variations

The potentialities for educational extension and variations of WQM have been discussed in the preceding section on learnings. A different kind of potential, which emerged after GPAP began, lies in the social utility of such activity. Several NGOs around the country evinced interest in using WQM to address problems of drinking water quality in various localities. WWF-India organized a workshop for such NGOs and used the GPAP kit to train and equip them for such work. Subsequently WWF developed its own modified version of the kit.

However, in most localities, problems of drinking water quality are confined to one or two critical parameters specific to that area. A multi-parameter kit such as the one developed by CEE, or WWF's modification of it, would be underutilised in that several of its capacities would not be relevant to the type of work to be done. A more effective way of addressing this

need would be to develop single-parameter kits which NGOs could acquire and use according to the particular problems of their locales.

The most critical need in this regard, relevant to a major part of the country where protected water supply does not exist, is a kit to test for the faecal contamination of water. This is the single most important cause of morbidity in India. The most reliable traditional lab tests for such contamination require sophisticated equipment and techniques, assured control conditions and methodological rigour which is beyond the grasp of people not trained for such tasks. The tests are also very time-consuming. There is room for research and development for easy-to-use, rapid testing kits for this purpose.

A second possible extension in WQM, also of interest to NGOs, is to monitor pollution of water bodies on which the environmental well-being of sizeable communities depends. There is a felt need for such work to back up the promotion of public awareness,

representations to pollution control authorities, environmental litigation, and a number of other socially motivated actions. In this area, multi-parameter kits have a definite role, but they need to be more comprehensive, capable of handling more complex parameters of water quality. Also, a kit can only be a supporting component of a WQM programme. Fulfilling the main objectives of such a programme requires education, training and skill development among those who are going to do the activity. It needs sensitization and orientation of those to whom the results of the activity are going to be presented for remedial action. This calls for a different kind of approach than that followed in GPAP. Such an approach is not impossible, but its details will have to be worked out. The ultimate aims of any such programme, as indeed of all EQM programmes, should be the demystification of science, the promotion of scientific temper, and the empowerment of ordinary people to use science for a social purpose.

Sample Activity: Testing for Odour

Odour in water could be due to sewage and industrial wastes, for they may contain halogens, sulphides or other chemical compounds. Odour is undesirable in drinking water, as also in the water used for certain industrial purposes.

Requirements

Equipment 100 ml beaker
Reagents: Nil

Precautions

1. Students testing odour should not have a cold or other nasal problems.
2. Sense of smell varies from person to person. For good results, get about five students to smell the sample separately.

Testing Procedure

- Fill about 3/4 of the beaker with the sample water and smell it. Do this on the site itself immediately after collecting the sample water. If left for later, the water may lose its odour.

- Record your observation in a table like the one given by putting a tick mark against the relevant odour.

Observations

Tests	1	2	3	4	5
Intensity of odour					
i. No odour					
ii. Faint					
iii. Distinct					
iv. Very strong					
Type of odour					
i. No odour					
ii. Fishy					
iii. Sweetish					
iv. Unpleasant					
v. Other(specify)					

Intensity of odour

- No odour :
- Faint :
- Distinct :
- Very strong :

Type of odour

- No odour :
- Fishy :
- Sweetish :
- Unpleasant :
- Other(specify) :



Students in Natural Resource Management

R. Shailaja and Sudha Premnath

Introduction

India has the seventh largest land mass in the world. This has been conditioned by land use, geographic and climatic factors into ten recognisably different bio-geographic zones. These zones harbour a variety of ecosystems such as mountains, plateaus, forests, grasslands, deserts, wetlands and coral reefs. With increasing demands and more advanced modes of exploitation of rich natural resources in a variety of ecosystems, the conservation and proper management of natural resources has become the need of the hour. This requires long term planning based on scientifically collected micro-level information on different environmental parameters, coupled with the participation of local-people.

The first step, therefore is to generate reliable information based on the present status of the environment at micro-level. This is essential in identifying the salient features and/or local-specific problems of the different regions for any meaningful planning. However, given the existing diversity in climate, topography, soil vegetation, and life forms in our country, collecting information is not an easy task. It requires a large number of trained, dedicated personnel, as it is laborious, time consuming and requires good amount of skill.

Involving educational institutions can possibly overcome this problem. High school, undergraduate and postgraduate students in different regions can take up the study of a suitable ecosystem close to their place, along with their teachers. Such an approach will expose the students to transdisciplinary principles and concepts of environment, techniques of uncovering facts, methods of understanding and identifying the problems of environment, finding better directions and

choices that may improve environmental conditions. The interaction with various living and nonliving systems including the social, biological, cultural, physico-chemical, economic, educational and political, will help them in understanding the ecosystem as a whole, and in learning techniques of information collection and analysis. This, in turn, may bring transformation in them by inculcating positive attitudes regarding proper management and utilization of local natural resources. Involving students in the process of decision making increases their level of confidence.

This paper describes a pilot programme launched by the Centre on the above guidelines. Though this programme has been carried out with the involvement of undergraduate students, it is possible, with suitable modifications, to involve high school students in similar efforts.

A Monitoring Experience

This programme called "Environmental Quality Monitoring" was initiated in 9 districts of Karnataka with 20 undergraduate colleges. The objectives of the programme were:

1. To expose the undergraduate students to transdisciplinary concepts and principles of ecology and environment.
2. To design and develop simple, scientific methodologies for inventorying and monitoring various environmental parameters of a given ecosystem for use by youth, particularly for the undergraduate educational institutions.
3. To develop field-oriented training modules for the undergraduate group for inventorying and monitoring various environmental parameters.

4. To improve the scientific skills in discovering facts and identifying the environmental problems, by performing experiments, observations, surveys and collection, analysis and interpretation of information.
5. To promote logical, independent thinking and reasoning. These in addition to increasing the spirit of inquiry, creativity, objectivity, instills a sense of values for and nature and its resources.
6. To establish a link between educational institutions, research organisations and local communities in order to take decisions and make choices based on the gathered information. This may improve the environmental conditions and hence the quality of life of the local community.

Centre for Environment Education, Southern Regional Cell, Bangalore, provided infrastructural facilities for the programme.

Research Methodology

This programme was planned out in 3 phases.

Phase I

Initiated during the year 1994-95, the work plan of Phase I was to identify the environmental parameters to be studied, prepare field manuals, select the undergraduate colleges and train the selected teachers. A brief explanation of the steps is given below.

Identifying the environmental parameters:

The environmental parameters identified were grouped into five areas: biomass (vegetation), land use and soil, water, energy, human and livestock resources. This covered almost all environmental parameters.

About the field manuals:

Literature concerned with ecological methods and analysis is limited and scattered. Most methods are either not well defined, or are

described in a complex fashion involving many technical details. Considerable time is spent searching for simple, appropriate methods. Realizing the need for simple, scientific methods for students to monitor various environmental parameters, field manuals were prepared. The manuals contain the objective of monitoring, importance, materials required, sampling techniques, description of methods, collection of data, analysis and interpretation of the information. We have to incorporate flexible methods which may be adapted depending on the situation, availability of time, materials, and the number of students. These manuals are used as a reference guide by students and teachers during the field study.

Selection of undergraduate colleges

About 20 undergraduate colleges from 9 districts of Karnataka were chosen for the pilot project. These 9 districts spanned different bio-climatic zones from semi-arid to semi-humid to humid. The colleges had both science and social science faculties. About 70 to 75 per cent of students came from the surrounding rural areas and the rest from urban areas. The student composition and combination of faculties offered an ideal situation for an environmental monitoring programme.

Meetings with institutional heads:

As a next step, a meeting of the principals of the selected colleges was organised to introduce the concept and procedures of the programme, their role and involvement. Their co-operation was sought for the programme. During this meeting it was also decided to select two or three lecturers from both science and social science faculties to co-ordinate the programme.

Capacity building:

It was necessary to discuss the programme in detail with the selected lecturers and also to improve their capacity and skills in field methods and analysis. A training, therefore, was organised in three batches of 30 lecturers

each for five days. The participating lecturers were an interested and motivated group. Of the 90 lecturers trained, 50 per cent belonged to biology, 20 per cent belonged to physical sciences including mathematics and statistics, and the remaining 30 per cent belonged to social sciences including languages. The lecturers in turn passed on the skills to the student groups.

Phase II

This phase involved formation of student groups, selection of ecosystems, inventory and monitoring of the environmental parameters and analysis of the collected information. This started during 1995-96.

Teaming up of students and selection of the study area:

Each college selected about 20 to 25 students for the study from both sciences and social sciences. Each team selected an area, preferably one close to the institution. The area ranged from about 400 to 1000 hectares, depending on the team size. The study areas included both relatively natural and agro ecosystems. The areas were further divided into subsystems like agriculture land, waste land, forest land and so on.

In the field:

Before the field investigation, students collected secondary information on the land, land use pattern, vegetation, crops, water sources, history, geography, demography etc. from various sources such as documents and personal interviews. Local maps, district maps and toposheets were collected for the study. Lecturers demonstrated field methodologies before the students started the study. Based on the secondary information, students with the help of the lecturers, prepared questionnaires for collecting primary information on socio-economic status of the area. Students carried out a census survey in groups of four. This helped in choosing the samples for studying the status, production and consumption of natural

resources by direct measurements. The data thus collected was analysed for identifying the problems regarding natural resources.

Meetings and discussions:

Periodic discussions were held amongst the students and lecturers about the progress of the work. Apart from this, review meetings were organised once in six months where all the monitoring teams participated. In review meetings each team presented the progress of their study, problems involved, usefulness of the study in their respective area and the future work plan.

Reporting:

Students prepared two status reports. One report gave a detailed account of the methodology, results and discussion which would help in comparing the two different ecosystems and also serve as baseline for any group which would monitor the environment at a later stage. The second one reported the important features and salient results of the study with possible management practices for various natural resources. This is expected to help the local governmental bodies for planning the natural resources at the local level leading to sustainable development.

Development of Geographical Information System (GIS):

The information collected by the teams is very good. We have tried to incorporate the primary and the secondary information of some of the teams into GIS, which is a computer assisted programme for the acquisition, storage, analysis and display of geographic data. This Geographical Information System is very useful in drawing up micro-level planning strategies for efficient and meaningful natural resource management.

Phase III

This phase involves the following elements:

- Identifying the specific prescription for

sustainable resource use, based on the information gathered.

- Developing communication packages for the local community on various technologies and sustainable practices.
- Demonstration of some technologies in two ecosystems.

This phase has just begun (1996-97).

Problems and solutions:

Based on the information, problems in the ecosystem are being identified. Some of these are declining crop and tree diversity, leading to homogenisation, severe smoke problem in kitchen rather than the fuel scarcity, excessive use of pesticides and chemical fertilizers and local people losing confidence in traditional practices. These problems are being discussed with the experts in the respective subjects for necessary actions by the students and local community.

Communication package:

Awareness materials are planned for the local community. The contents of awareness material include the status of natural resources in the selected area, the problems if there are any, technology or practices that are available to reduce the pressure on the natural resources. Some awareness materials prepared are in the form of charts and brochures. Some of the themes selected are fuel efficient smokeless stoves to reduce smoke and fuelwood problems, alternate energy sources like biogas and wood gassifiers, role of pesticides and importance of soil testing.

Demonstrations:

For the demonstration of technologies, student teams from 3 out of 20 colleges were selected. This was due to the resource constraints, particularly finances. One team from semi-arid Karnataka (Tumkur) chose to disseminate three types of fuel efficient smokeless wood stoves, realising the problems of smoke and fuel, in the

study area. Before dissemination, a discussion was held on the problems of smoke and fuel and performances of various improved stoves with the local community. About 40 stoves have been disseminated in two villages so far and requests are pouring in for the stoves. After an awareness programme on alternate technologies and a field visit by a local group, two farmers have come forward to install wood gassifiers at their own cost.

The second team from semi-humid area in Western Ghats (Sringeri) has planned to popularise unburnt soil-cement brick blocks at the request of the local people. This they hope will reduce the pressure on the rain forests for fuel.

The third team from the humid region of Western Ghats (Sullia) has just established a medicinal plant unit in their ecosystem for the benefit of the local community and to bolster their confidence in traditional medicine. They are also in the process of developing awareness material for the local community on the importance of medicinal plants.



Photo courtesy: CEE-South

Schedule

Students spent about 20 to 30 days in the field depending on the area and number of students. Once they collected the information, analysis and interpretation was done back in their colleges during

free hours. This took about 15 days.

The field work was carried out by two methods. The first method involved camping in the

selected village for about 8 - 10 days. About 60 per cent colleges adopted this method. Out of this, majority of the colleges selected the ecosystem in such a way so that National Service Scheme (NSS) students also could adopt the same ecosystem for their field work. This method was very successful because, while monitoring students collected the information, NSS students were helping the local community by laying roads, cleaning wells, etc. and also spreading the word on environmental awareness through street plays, songs and dramas. This made an impact on the local people and information collection became easy.

The second method involved going to the ecosystem during the weekends and holidays, and not staying there. About 40 per cent colleges, particularly from Western Ghats area adopted this method.

In both the methods, about four to six students belonged to the selected area and hence information collection became easy as they knew how, where and whom to approach for reliable information. Another advantage was that they knew each and every corner of the area well.

Student Participation

On the whole, about 500 students participated in this programme.

Financial Implications

About Rs. 1000 was spent for training one lecturer for 5 days during Phase I. In Phase II, each college spent about Rs. 8,000 to 10,000 per year for information collection. About 50 per cent of the money was spent on food and conveyance during the field trips, about 25 per cent was spent on chemicals, small equipments, paper etc. and the remaining 25 per cent was spent on documentation and report preparation. In Phase III, each of the three colleges selected to carry out some field demonstrations and prepare awareness materials will be spending about Rs. 10,000 to 15,000.

We would like to repeat that the information collection by the students which is the main part of the programme requires about Rs. 10,000 per college per year.

Programme Limitations

This programme which is about two years old has yielded the following learnings.

Voluntary research

As far as the weaknesses are concerned, at present this programme does not form a part of the undergraduate course. It is purely on a voluntary basis. Colleges, teachers and students who are motivated and interested in field research have taken part in this programme.

No academic credits

At undergraduate level, the curriculum does not provide much scope for field work in either sciences and social sciences. It is, therefore, difficult to introduce such field oriented programmes even if they have practical value into the curriculum. Also, at undergraduate level, small projects are not a part of the curriculum. Hence, there is no academic credit given for any field research. This is a major constraint in the programme.

Time limitation

Since it is not a part of the curriculum, time available for students to perform such research is limited. Teachers and students hence use holidays and weekends for the field work which, in the long run, may not be a feasible solution.

Finance and other resources

Since this programme requires about Rs. 10,000 per college per year for 25 students and three lecturers, the number of students gets restricted. All students will not be able to participate in this programme. Fortunately 19 colleges out of 20 that we have selected had good infrastructure like laboratory and equipments. All these belonged to private

management system. One Government college did not have a building, or laboratory. The number of lecturers a college has also becomes important while taking up such a study.

Other constraints

Some lecturers who participated in this programme wanted remuneration to co-ordinate this study as they felt it to be extra work load. Problems like trained lecturers getting transferred, changes in the headship of the colleges are a reality. Minor constraints in field work include availability of basic facilities like food, clean water, transport, toilets.

Dealing with Problems

All the above constraints have to be dealt with to make the project sustainable in the long run. Introducing field research in the curriculum is one way to deal with some of the major constraints like time, credits, involvement of lecturers and all the students. Such research should be introduced carefully into each subject, highlighting the relationship between the subjects such as sociology, economics, biology, history, statistics, geography and environment. For example, introducing biodiversity field research for biology students; soil, water, air analysis for chemistry students; environmental history for history students; sampling methods and information analysis for statistics students—will make field research interesting. Such a diversification seems to be more appropriate than introducing one course at all levels for all subjects. First, the plug points in the curriculum in each subject have to be identified to introduce the field research.

As far as finances are concerned, Rs.10,000 per college per year is definitely not a huge amount when compared to the extent of useful and meaningful information the exercise provides, and the educational value for the students.

Learnings from the Experience

Our experience is that with the given

limitations, the performance of the students is very encouraging. The study has helped the students and teachers

- To learn about environmental concepts, status of natural resources, reasons for degradation and its consequences including the impact on the quality of life, through participatory field research.
- To understand the interrelationship between different subjects such as biology, history, economics, geography, and between these subjects and the environment that they are living in, thus giving the exercise a holistic practical value.
- To acquire the skills and capabilities of field work, data collection using scientific sampling techniques, statistical analysis and interpretation of the data collected.
- To communicate the information to local community using various methods.
- As the students participate at all levels of the programme from data collection to decision making their potential and dynamism are guided in a positive manner.

This study has also helped local communities to understand more about their environment,



Photo courtesy: CEE-South

present level of natural resources extraction and its consequences, modern technologies and importance of traditional practices and their contribution to sustainability. The study has generated ground data

which will assist local decision makers in the micro-level planning.

Inventory and monitoring of natural resources which involves exhaustive survey of the resources, systematic recording and periodic analysis of the information gathered, is an essential aspect for long-term planning. It gives an in-depth understanding of the resource status, identifies community needs and promotes better resources planning both at individual and community level.

Equipped with better skills for generating and analysing scientific information, undergraduate and postgraduate students between the age group of 15-29 years can form significant proportion of human resources for monitoring environmental quality. Such field research would also provide excellent opportunity for teachers and students to learn about their

environment through hands-on experience and take decisions about management practices. It is also possible to carry out long term monitoring, involving students, for a variety of ecosystems simultaneously, as they are distributed over space and time. Thus, the student population can make a substantial contribution in improving and updating the database for large areas in shorter time and with small grants.

Serious thinking should go into introducing such field research which is interesting, practical, beneficial, cost-effective and also has social relevance, at undergraduate and post-graduate levels in every college in the country involving the whole student community. This will not only benefit the students to the maximum but should also harness their potential and energy for the benefit of the community.

Environmental Monitoring

Environmental monitoring is an essential aspect of resource planning and management. It involves an exhaustive survey of resources, systematic recording and periodic analysis of the information gathered.

Monitoring the environment can be an excellent activity, not merely to create awareness but also to learn science, using the skills and tools of observation and measurement.

Monitoring

- gives an in-depth understanding of the status and dynamics of the resources in the ecosystem.
- identifies the needs of the community.
- helps in evaluating people's own actions.
- gives a continuous feed back during project implementation thus ensuring quality.
- helps in evaluating ongoing projects.
- provides an accurate information base for future projects.
- furnishes information to decision makers.

Steps in Planning an Environmental Monitoring Programme

1. Defining the objectives of monitoring clearly
2. Selecting the parameter
3. Choosing simple, clear, cost-effective methodology based on the monitoring objectives
4. Selecting the sampling method
5. Selecting the time for data collection
6. Collecting information
7. Analyzing and interpreting the information and drawing conclusions
8. Evaluating the monitoring program for methodology, usefulness of data, feasibility and practical application, cost, data storage and continuity
9. Revising the objectives if necessary
10. Revising the methodologies
11. Continuation and / extension of the monitoring programme

"Throughout education, from the first day to the last, there should be a sense of intellectual adventure. The sense of understanding what had been puzzling is exhilarating and delightful: Every good teacher should be able to give it."

— *Bertrand Russell*

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